FHWA Workshop

Multi-Jurisdictional Coordination for the Great Lakes Region

February 22–23, 2018
Columbus, OH

Final Report—June 2018

U.S. Department of Transportation
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This report reviews and highlights key content and outcomes identified at the Multi-Jurisdictional Coordination for the Great Lakes Region Workshop held on February 22–23, 2018 in Columbus, Ohio. The event was sponsored by the Federal Highway Administration's (FHWA) Office of Planning, Environment, & Realty (HEP) to examine shared regional issues of mutual concern to FHWA and transportation stakeholders in the Great Lakes Region (Michigan, Ohio, West Virginia, and central and western Pennsylvania).

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INTRODUCTION

On February 22–23, 2018, the Federal Highway Administration (FHWA) convened a workshop in Columbus, OH titled "Multi-Jurisdictional Coordination for the Great Lakes Region." The workshop brought together public- and private-sector decision-makers to discuss how they can better connect and work together to address multimodal freight transportation and emerging technologies across jurisdictional boundaries in the Great Lakes region. For the purposes of this workshop, FHWA defines the Great Lakes region as comprised of Michigan, Ohio, central and western Pennsylvania, and West Virginia.

During the workshop, transportation officials and planning representatives from the four States explored ongoing research and collaboration, best practices, and opportunities to coordinate on goods movement and emerging transportation technologies. Towards the end of the workshop, participants discussed common needs across the jurisdictions and potential collaboration steps for the future.

WORKSHOP BACKGROUND

Beginning in 2016, FHWA launched a series of workshops and peer exchanges in select areas to identify how FHWA, State Departments of Transportation (DOT), Metropolitan Planning Organizations (MPO), and the private sector can enhance coordination and collaboration to address transportation needs across State and metropolitan boundaries. The Multi-Jurisdictional Coordination for the Great Lakes Region workshop is part of this series of events. FHWA held prior events in Phoenix, AZ; Philadelphia, PA; Memphis, TN; Atlanta, GA; Providence, RI; and Chicago, IL.

Over the course of several months leading up to this workshop, FHWA Office of Planning staff worked closely with FHWA Division offices within the Great Lakes Region and the Mid-Ohio Regional Planning Commission (MORPC) to identify and prioritize workshop topics tailored to the Great Lakes Region and develop the workshop agenda. The event took place over a period of one and a half days, and featured a welcome session with remarks from local hosts—the Ohio Department of Transportation (ODOT), MORPC, and the FHWA Ohio Division. This was followed by several sessions involving presentations from numerous State, local, MPO, academic, and private-sector representatives, discussion of key issues raised in each session, and breakout sessions on select topics.

This document summarizes the workshop presentations discussions, and steps identified by meeting participants. Appendix A presents the workshop agenda; Appendix B contains a Great Lakes Region white paper; Appendix C lists key FHWA contacts; and Appendix D contains a list of workshop participants.

PART 1—SETTING THE STAGE

WELCOME AND INTRODUCTIONS

Spencer Stevens, FHWA Office of Planning, opened the meeting and welcomed the workshop participants. He emphasized that the event is focused on the topic of multi-jurisdictional coordination for freight and emerging transportation technologies in the Great Lakes Region. The agenda and speakers were selected with these topics in mind, and at the end of the event

the participants will have a greater understanding of the opportunities to collaborate across boundaries.

Andrew Bremer, Managing Director of Local Affairs, DriveOhio

Mr. Bremer welcomed the participants and thanked FHWA and MORPC for developing the workshop. In his position with DriveOhio, he coordinates multi-agency and multi-jurisdictional activities and initiatives for Ohio's smart technology deployment and connected and autonomous vehicle pilots. There is a lot of buzz around autonomous vehicles in Ohio, but he believes connected vehicles have the most promise of meeting transportation goals. This is particularly true when talking about safety; serious injury crashes are on the rise, and Ohio's transportation system had 1,133 fatalities in 2016. This statistic is reason enough to pursue implementation of vehicle technologies and their promise to improve safety. Doing so will involve extensive coordination across jurisdictions.

William Murdock, Executive Director, Mid-Ohio Regional Planning Commission (MORPC)

Mr. Murdock welcomed the participants to Columbus. MORPC serves as a planning organization for the greater Columbus region and focuses on energy, sustainability, and transportation policy. Within the region there is a balance of urban and rural interests. MORPC recently launched a Rapid-Speed Transportation Initiative to explore intercity routes between Chicago, Columbus, and Pittsburgh that could utilize traditional passenger rail and/or Hyperloop technology. The technologies will serve passenger and freight needs and involve partnerships across jurisdictions and with the private sector, so this workshop is directly related to this initiative. Columbus also was the recipient of a Smart Cities grant from U.S. DOT. Mr. Murdock thanked his staff for coordinating with FHWA to set up this workshop.

Leigh Oesterling, Planning and Environment Team Leader, FHWA Ohio Division

Ms. Oesterling welcomed participants on behalf of FHWA and commented that this effort is similar to FHWA's Every Day Counts Regional Models of Cooperation initiative. She emphasized that multi-jurisdictional coordination is about developing relationships and encouraged participants to look for opportunities to do so.

STARTING THE CONVERSATION: PLANNING AND ADDRESSING FREIGHT AND EMERGING TECHNOLOGIES ACROSS JURISDICTIONAL BOUNDARIES

This session provided an overview of workshop goals and set the stage for the remainder of the event.

Catherine Ross, Director, Georgia Tech Center for Quality Growth and Regional Development

Dr. Ross spoke in detail about the purpose of the workshop: advance the concept of coordinating across jurisdictions, connect and collaborate across public and private sectors, identify common transportation and economic interests in the Great Lakes Region, and identify next steps to implement the concept of multi-jurisdictional coordination.

Dr. Ross discussed the concept of megaregions, which are areas that are connected through economic interactions as well as proximity and have an extra layer of shared social, cultural,

and environmental characteristics. Multi-jurisdictional planning and coordination within these broad regions provides an approach to address emerging challenges that transcend traditional borders. Benefits of this approach include enhancing economic development across jurisdictional boundaries, sharing best practices, sharing data and information, and identifying projects or services that enhance the mobility of people and goods across the broad area.

Dr. Ross showed a U.S. map with 13 megaregions, each with a defined boundary. She emphasized that the boundaries are not important. What is important is the framework represented by the map, which identifies regions that are economically linked. The boundaries, and thus the framework, are changeable depending on the topic, whether it is transportation or another issue. In addition, Dr. Ross displayed a different U.S. map with e-commerce warehouses and key transportation infrastructure overlaid on the megaregion boundaries. The map shows that these key economic assets are concentrated in the megaregions.

FHWA provided a Great Lakes Region white paper to attendees prior to the workshop (and is included in Appendix B of this report). The paper describes the region in terms of its key transportation-related characteristics and highlights the region's transportation challenges and opportunities. The Great Lakes Region accounts for more than 10 percent of the national Gross Domestic Product, and has abundant transportation infrastructure. It has a high density of development patterns and economic activities, with numerous multimodal connections between population centers within the region. The region faces some transportation challenges however, including repair and maintenance needs, capacity constraints, and a need for additional truck parking facilities. Opportunities include new transportation technologies, rail and intermodal upgrades, and a prevalence of existing successful partnerships.

Q&A/Dialogue

Question: Parts of the outer area of the Great Lakes Region are growing towards other regions. What does this mean for this region?

Answer by Dr. Ross: The map is illustrative and boundaries will change over time with changes in other factors such as the economy, freight flows, and population.

Question: The Midwest is one of the largest regions, but it has recovered from the recent recession at a slower pace than other parts of the U.S. What role does transportation play in economic recovery?

Answer by Dr. Ross: Boundaries are scalable when considering economic networks, and transportation improvements outside of a region can result in economic gains within the region. For example, analysis of improvements to the Panama Canal show economic benefits in every county in the State of Georgia. This shows that funding improvements and maintenance in our transportation infrastructure has far-reaching benefits.

PRIVATE INDUSTRY PERSPECTIVES ON TRANSPORTATION AND FREIGHT NEEDS

In this session, moderated by Tamiko Burnell, FHWA, three speakers from the private sector discussed their perspectives on transportation needs in the Great Lakes Region and the importance of coordinating transportation planning across boundaries.

Mike Saneholtz, Honda North America

Mr. Saneholtz works in Honda North America's Logistics/Transportation Department in Marysville, OH supporting numerous North American manufacturing operations. In Ohio, Honda has several manufacturing facilities that produce vehicles and vehicle parts. Honda produced 671,656 automobiles in Ohio in 2016, and 1,956,196 units in all North American facilities. To accomplish this, Honda purchased more than $30.8 billion in parts from 823 North American suppliers in 2016. Honda does not operate its own truck fleets to move these goods; they contract with trucking companies. For North American operations, Honda utilizes more than 35 trucking companies that operate over 2,300 trips per day covering more than 750,000 miles.

Manufacturers want just-in-time inventory. As a result, they are heavily dependent on on-time delivery of manufacturing commodities. For Honda, this means several trucks per day, every day, are necessary to keep operations going. Honda has invested in numerous supply chain enhancements. These include software to eliminate underutilized truck shipments, thereby reducing the number of trucks needed, as well as real-time route tracking and reporting and load configuration software for trailer optimization. A big challenge to Honda is weather. They need current, accurate road and weather information to determine road conditions.
Mr. Saneholtz presented a slide that showed traveler information screenshots from Ohio and several surrounding States to highlight the variety of ways in which comparable roadway condition/traveler information data was being made available by agencies. The availability and format of the data differs from State to State. This makes Honda's ability to use this critical information in day-to-day operations more challenging.

Adrian Burns, Director—Columbus Region Logistics Council, Columbus Chamber of Commerce

Mr. Burns is the director of the Columbus Region Logistics Council, which serves as a resource center and advocate for the logistics industry in central Ohio. The Council is an initiative of the Columbus Chamber of Commerce. He spoke about three factors that are creating a perfect storm of transportation. The first is a strong economy, in which activity is growing rapidly. The number of containers is increasing while the supply of truck drivers is decreasing, resulting in a shortage and rising prices. The second factor is the rise in e-commerce, which requires more trucks on the road and increased trips on local roads and into neighborhoods. The third factor is technology. Significant amounts of money are being spent on technology research because the transportation problems are large and the potential of technology to solve some of the problems is promising. Navigating these three factors while implementing technology solutions will require extensive collaboration between the public sector, which builds infrastructure, and the private sector, which are users of the transportation system.

Bryant Thomas, Manager—Government Relations, Norfolk Southern

Mr. Thomas manages legislative affairs and community relations in Ohio for Norfolk Southern (NS). In 2017, NS experienced operating revenues of $10.6 billion, which was a 7 percent increase over 2016 and reflects growth across the sector for all U.S. rail traffic. Freight railroads have spent billions of dollars in recent years on capital improvements and maintenance in order to be prepared for growth, including $22 billion in 2017. A large portion of this goes toward maintenance of the current rail system. The railroad industry believes that the U.S. Federal Government must stabilize the Highway Trust Fund (HTF) with sustained revenue rather than

transfers from the general fund, but acknowledges that this is easier said than done. The difficult question is how this should be funded.

Q&A/Dialogue

Question for panel: Improvements in manufacturing logistics and freight transportation have large implications for employment and economic development. How can State DOTs and MPOs partner with rail companies and the transportation investments they make?

Answer from Mr. Saneholtz: Industry wants to see that improvements can be made quickly, and that they address safety.

Answer from Mr. Burns: It comes down to setting priorities because the needs are broad but the available resources are limited. Coordination to establish common priorities is helpful.

Answer from Mr. Thomas: Take a holistic approach that looks at multimodal solutions; the railroad and trucking industries are partners and depend on each other for movement of goods.

Question for panel: Are there specific actions the Federal Government or the States can collectively take that would help improve their business?

Answer from Mr. Thomas: Make it easier to invest in connectivity to facilities such as ports or intermodal facilities.

Answer from Mr. Burns: New technologies will create policy and regulatory challenges. States will need to work together in order to avoid a patchwork of different requirements.

Answer from Mr. Saneholtz: Agreed with Mr. Burns and added that technology will help address many of the problems we currently face.

Question for panel: What are your thoughts on public-private partnerships to implement multimodal corridor solutions?

Answer from Mr. Thomas: There are examples, such as an inland port, where this may make sense. In other corridors, such as I-81, it may not be financially viable.

Question for panel: What challenges do you experience with developing the workforce needed for transportation and good movement?

Answer from Mr. Saneholtz: Honda sees driver retention as a problem that needs to be addressed. Trucking companies are running driver training programs and coordinating with driving schools, but it takes time to complete training.

Answer from Mr. Burns: A focus on vocational training is important because not everyone wants to or is able to get a college degree.

Answer from Mr. Garland: Workforce development has been a topic of discussion at recent transportation conferences. This is an area in which Government and industry can partner to develop solutions. For example, there are age restrictions for drivers in many States. Ohio is working on legislation to address this.

Question for panel: Is there hope that the public and private sectors will have success working together to address these transportation challenges?

Answer from panel: There is indeed hope. New data that will help us analyze problems and develop solutions is increasingly becoming available. There is a great deal of collaboration underway now, and the private sector is committed to continuing to work together. We need to continue to identify the benefits of working together and communicate those benefits to decision-makers.

MULTI-JURISDICTIONAL COLLABORATION AND BUILDING PARTNERSHIPS

This session featured two collaboration efforts that are underway in the Great Lakes Region. Thea Walsh, Director of Transportation Systems and Funding at MORPC, facilitated the session. She began by saying that nothing happens without collaboration. MORPC believes that reaching out to partners they do not typically work with is necessary to advance transportation priorities. When Ohio State University (OSU) approached MORPC with ideas for working together to address transportation technology issues, MORPC was immediately on board and from there a partnership developed.

Dorota Grejner-Brzezinska, Associate Dean for Research, Ohio State University (OSU)

Ms. Grejner-Brzezinska is the Associate Dean for Research in the College of Engineering at OSU, where she oversees research into navigation and mobile mapping. Columbus is among the metro areas with the highest amount of university-based research and development that is funded by the private sector. Between 2010 and 2017, more than $170 million in industry sponsored research has taken place at OSU, with 42 companies sponsoring more than $1 million apiece. Government sponsored research also is underway.

OSU is engaged in all aspects of research related to safe, efficient and sustainable mobility. With technology increasingly becoming more complex, collaborative forms of research and development are the most productive. This collaboration allows researchers from different sectors to actively engage with each other and with a wide array of users, competitors, and developers of complementary technologies. Ms. Grejner-Brzezinska noted that the collaborative environment at OSU between public and private enterprises leads to knowledge spillovers and higher productivity, translating to better output and higher GDP growth.

Several areas of research at OSU provide opportunities to further develop partnerships to address freight transportation and emerging technologies in the Great Lakes Region. These research areas include resilient infrastructure, traffic flow modeling that accounts for connected and autonomous vehicles, multimodal mobility systems, policy development and implementation, and effective business planning. The workshop's focus on multi-jurisdictional coordination provides a framework to identify and address common mobility and economic development challenges and opportunities and inform research efforts. Joint grant proposals

that involve academics and the public and private sectors are one way to enhance this collaboration.

Mark Compton, Chief Executive Officer, Pennsylvania Turnpike

Mr. Compton spoke about the Smart Belt Coalition, which is a partnership between Michigan DOT, Ohio DOT, the Ohio Turnpike and Infrastructure Commission, Pennsylvania DOT, and the Pennsylvania Turnpike Commission to collaborate on research, testing, policy, funding, and deployment of connected and autonomous vehicle technology. The Coalition also consists of six affiliate members: the University of Michigan, American Center for Mobility, Kettering University, the Ohio State University, Transportation Research Center, and Carnegie Mellon University. The State agencies are responsible for guiding research, development, and deployment of smart technologies, while the affiliate members are responsible for conducting research efforts.

The Coalition serves as a great example of coordination across multiple jurisdictions to develop a connected and autonomous vehicle network. The group established priority applications for the near term: a work zone reservation and traveler information system, traffic incident management, truck parking, and truck platooning. Looking ahead to 2022 and beyond, the coalition aim's to be a worldwide leader in connected and autonomous vehicle technologies with a track record of implementation solutions and proof that collaboration works.

One of the lessons learned is that they should be spending more money on IT. Mr. Compton has discovered that innovation in Government is difficult; agencies are generally focused on being stewards of public funds, not on taking big risks or getting too far ahead of current practice. To address this tendency, he created an internal project team that serves as a support structure, comprised of staff across departments, including legal, policy, outreach, procurement, legislative, and funding. This allows for the various pieces to fit together and for everyone to be on the same page internally when working with external parties. Mr. Compton emphasized that MPOs will have a significant role to play in implementation of technology solutions because funding decisions will need to be made, and they can help communicate the value of technology investments and resulting benefits to decision-makers.

PART 2—CURRENT AND NEAR-TERM MULTI-JURISDICTIONAL INITIATIVES

STATE DOT PERSPECTIVES ON FREIGHT, EMERGING TECHNOLOGIES, AND MULTI-JURISDICTIONAL COORDINATION

In this session, a member of each State DOT discussed freight, emerging technologies, and multi-jurisdictional coordination activities in their State. Brandon Buckner, FHWA Office of Planning, facilitated the session. Remarks made by each speaker are summarized below, followed by the summary of the Q&A session.

West Virginia Department of Transportation (WVDOT)

Perry Keller, Section Head for Statewide Planning, provided remarks for WVDOT. The State recently completed a freight plan. The Department conducted a freight survey in late 2015 to gather information that was used to establish priorities and identify needs, and held a roundtable forum to identify freight projects and prioritization criteria. WVDOT is a member of the I-81 Corridor Coalition along with five additional States. The Coalition coordinates operating and

capital plans and freight, truck, and rail study planning. States along the corridor have experienced growth in distribution centers and rail-truck terminals, although most of the goods moving on the I-81 corridor are passing through. Proctor & Gamble is opening a $500 million manufacturing plant this month with hundreds of new jobs, which will have an economic impact in West Virginia as well as neighboring States.

Michigan Department of Transportation (MDOT)

Elisha DeFrain, Transportation Planner at MDOT, reported that the Department is working on a FAST Act-compliant freight plan. In its next iteration of the freight plan, Michigan will be the first State to incorporate a State rail plan and freight plan into the long-range statewide transportation plan. The freight plan addresses new transportation technologies, including connected and autonomous vehicles, ITS, unmanned aerial systems, the Internet of Things, and more. Michigan has more than 100 miles of highway functioning with the Truck Parking Information and Management System, which is described in the white paper. The State also is home to technology testing and implementation facilities, and partners with neighboring States on connected and autonomous vehicles via a testing facility at University of Michigan. Michigan welcomes forming partnerships to address transportation challenges and find solutions. MDOT is 1 of 10 States that belong to the Mid-America Association of State Transportation Officials (MAASTO) and the Mid-America Freight Coalition (MAFC). Both organizations play a strong role in coordinating freight and transportation planning in the Midwest. Ms. DeFrain encouraged participants to keep having conversations and commended FHWA for putting this workshop together.

Pennsylvania Department of Transportation (PennDOT)

Brian Hare, PennDOT's Chief of the Planning and Contract Management Division, reported that the Department completed a MAP-21-compliant Comprehensive Freight Movement Plan for the State, and recently completed a companion document to be compliant with the freight provisions in the FAST Act. PennDOT developed a 30-member Freight Workgroup that works to maintain the freight plan through communication and collaboration. PennDOT is convening the Eastern PA Freight Summit in June 2018 to address industry trends, market developments, safety, efficiency, interconnectivity, land use impacts, and public-private collaboration. This part of the State is experiencing a significant amount of warehouse development and as a result there is an increased focus on planning. A potential outcome of the Summit is a public private partnership focused on truck parking.

Ohio Department of Transportation (ODOT)

Mark Locker is ODOT's Manager for Maritime, Freight Mobility, and Logistics. ODOT recently completed a FAST Act-compliant State freight plan. Ohio has a lot of freight activity; it has the fifth highest amount of Primary Freight Network, the fourth largest amount of Interstate, and is the seventh largest exporting State. Ohio also has a large waterway system. In the freight plan, ODOT looked at the secondary road system. While the Interstate system is robust, the secondary system, which is where many of the first- and last-mile connections take place, needs connectivity improvements. ODOT also focused on operational improvements over new capacity. This is one area in which technology will help.

Q&A/Dialogue

Question for panel: Is freight part of the curriculum at universities in the region?

Answer from Ms. Burnell: Most freight programs are based in business schools. FHWA is looking at ways to make these programs more multi-disciplinary.

Answer from Mr. Locker: Many Ohio schools offer internship programs where students are matched with a company after completing the program.

Question for panel: What is the level of local Government involvement in freight planning, since local jurisdictions have permitting and zoning control?

Answer from Mr. Locker: Columbus is looking at this in their Smart City efforts and is including a focus on design and zoning issues.

PLANNING FOR CONNECTED VEHICLES AND AUTONOMOUS VEHICLES

In this session, three speakers discussed their organization's role in planning for connected and autonomous vehicles. Egan Smith, Managing Director of the U.S. DOT Intelligent Transportation Systems Joint Program Office (ITS-JPO), facilitated the session. He talked about activities underway in the JPO, which include connected vehicle pilots in Wyoming, New York City, Tampa, and other areas.

Qiang Hong, Senior Research Scientist, Center for Automotive Research

Mr. Hong is a Senior Research Scientist at the Center for Automotive Research (CAR). His research focuses on the planning and policy implications of transformative automotive and transportation technologies. Prior to joining CAR, he worked for two MPOs so he brings a solid understanding of transportation planning to his research. CAR's mission is to conduct independent research to advise stakeholders, policy-makers, and the public on issues facing the automotive industry. CAR recently developed a technology roadmap for the automotive sector that will provide a broad understanding of product technology trends for powertrains and propulsion, materials, production systems, and, most importantly for this workshop, intelligent vehicles and mobility.

CAR's roadmap provides a timeline for the evolution of various technologies to unfold. CAR also documented State by State regulations regarding connected and autonomous vehicles and identified technology barriers and enablers. Long-term agreements on the regulatory future can enable technology advancements by providing automakers with certainty, while uncertainty will be a barrier to technology advancement. Consumer acceptance of new technologies also will impact the rate of technology advancement. Government can nudge consumers toward a certain path.

Andrew Bremer, Managing Director of Local Affairs, DriveOhio

In his role at DriveOhio, Mr. Bremer facilitates communication and coordination of multi-agency and multi-jurisdictional activities and initiatives for Ohio's smart technology deployment and automated and connected vehicle pilots. DriveOhio, which is supported by ODOT, works to

ensure Ohio's regulations and policies are conducive to the development of the infrastructure and technologies needed for smart mobility. This involves working with Ohio's public agencies and executive-level offices that address jobs, public safety, transportation, information technology, workforce development, public utilities, insurance, legal, and infrastructure as well as with stakeholders in Federal agencies, academia, and the private sector. As an initial step, DriveOhio will develop a statewide plan for smart mobility, systems engineering analysis, data assessment and plan, and opportunities for public-private partnerships. Mr. Bremer discussed the primary motivations for creating DriveOhio, which are to support economic development and improve safety in Ohio.

Randy Cole, Executive Director, Ohio Turnpike and Infrastructure Commission

Mr. Cole discussed the connected and autonomous vehicle activities of the Ohio Turnpike and Infrastructure Commission. The Turnpike offers numerous features that are attractive to freight companies and drivers, including modern service plazas, driver amenities, and facilities designed to accommodate long commercial vehicles. More than 55 million vehicles used the Turnpike in 2017, logging more than 3 billion miles of travel. The Turnpike was mostly free of traffic backups while experiencing a record low number of traffic fatalities. The Commission is instituting proof of concept vehicle-to-vehicle and vehicle-to-infrastructure communications networks that have the potential to significantly reduce the number and severity of vehicle collisions. The technology also will improve the efficiency of the Turnpike's operations and provide an opportunity for savings of labor and materials. Mr. Cole is actively engaged in the DriveOhio effort.

EMERGENCE OF SUSTAINABLE AND SMART MOBILITY IN THE GREAT LAKES REGION

In this session, three speakers discussed smart mobility initiatives in the region.

Brandi Braun, Deputy Innovation Officer, City of Columbus

Ms. Braun helps lead and oversee Smart Columbus, an initiative of the City's Smart City Challenge Grant. She also leads innovation strategies aimed at improving efficiency and effectiveness throughout the City. The mission of Smart Columbus is to demonstrate how an intelligent transportation system and equitable access to transportation can have positive impacts on everyday challenges faced by cities. Four outcomes are defined: improve safety; enhance mobility; enhance access to opportunities and services, and reduce environmental impact. The effort will create a connected vehicle environment, enhance human services provided by the City, and further the state of emerging technologies such as connected, electric and autonomous vehicles and truck platooning. A key part of the City's effort is supported by Vulcan, a private corporation established to promote philanthropic activities, and is focused on reducing greenhouse gases through decarbonization, electric vehicle fleets, multimodal mobility options, consumer electric vehicle adoption, and charging infrastructure. The program currently is in the early phases and is focused on data collection and system engineering.

Zack Huhn, Chief Executive Officer, Venture Smarter

Mr. Huhn directs Venture Smarter, which is a technology and analytics company geared towards streamlining solutions and implementations for smart cities, connected campuses, and advanced facilities. He also serves as the chair of the Institute of Electrical and Electronic Engineers (IEEE) Smart Cities Standards Committee and on the board of the Regional Smart

Cities Initiative. Mr. Huhn provided an overview of Venture Smarter and related smart city activities. Venture Smarter has four planning pillars directly related to smart cities: connectivity, mobility, security, and sustainability. It provides smart city leadership and engagement, and helps establish public-private partnerships focused on building smart cities and regions. Organizations pursuing a smart cities approach need to understand technology standards, policy frameworks, and resources to research, plan, fund, and deploy solutions that use technology as a tool to improve outcomes for people.

Mr. Huhn described IEEE SA P2784, Guide to the Technology and Planning Process to Build a Smart City. This guideline directly relates to the workshop because it provides a framework that outlines technologies and processes for planning the evolution of a smart city. It serves as a tool to plan for technology solutions and deployments that reflect the needs of constituents, which helps municipalities seamlessly connect from city to city, State to State, and region to region.

Mr. Huhn also discussed smart city efforts elsewhere and policy efforts at the Federal level, including a Congressional Smart Cities Caucus in the House of Representatives and a bill introduced in the Senate to expand the opportunity for more communities to fund innovative transportation projects.

Scott Bernstein, Founder and Chief Strategy + Innovation Officer, Center for Neighborhood Technology (CNT)

Mr. Bernstein spoke about accessible and affordable smart mobility. Housing and transportation costs can add up to more than 50 percent of expenditures for some households. Lowering expenses, combined with increasing income, can significantly reduce the number of people living in poverty. In addition, recovery rates from a recession are slower in the Great Lakes than nationally. One reason is lower productivity, while another is the high cost of operations for companies in the region. Mr. Bernstein discussed four smart mobility solutions, including realigning existing transit to meet real world demand, filling first- and last-mile gaps with “microtransit” and Transportation Management Organizations, reducing household travel, and providing mobility as a service. To address these issues, Mr. Bernstein recommended that agencies in the Great Lakes Region create a multi-jurisdictional working group on shared approaches, create a Great Lakes rating system or standards of service, open the discussion up to other interests, take local productivity into account, and aim for accessibility and affordability.

METROPOLITAN FREIGHT ACTIVITIES, EMERGING TECHNOLOGIES, AND MULTI-JURISDICTIONAL COORDINATION

In this session, several MPOs discussed freight planning, emerging technologies, and multi-jurisdictional coordination activities in their State. Brandon Buckner, FHWA Office of Planning, facilitated the session. Remarks made by each speaker are summarized below, followed by a summary of the Q&A session.

Southwestern Pennsylvania Commission (SPC)—Pittsburgh Region

Sara Walfoort is the Freight Planning Manager at SPC. Over the past two years, she has worked extensively on development of a Regional Freight Plan for the 10-county SPC region, and is now focused on implementation of the recommendations of the Plan. She fully endorses collaboration in the planning process and encourages increased communication between freight planners and other stakeholders. In developing the SPC freight plan, SPC knew it needed to be

multimodal. Prior to starting the effort, SPC did not have a solid understanding of freight in the region. In looking ahead, they borrowed an approach developed by the North Jersey Transportation Planning Agency called the Freight Rail Industrial Opportunity Corridors Program, which is based on industrial assets and looks at transportation services to these areas.

The region is experiencing more truck travel resulting in last mile and closer delivery issues. Navigating city streets is becoming more difficult as complete streets applications, such as bike lanes, bus pull-outs, crosswalks, pedestrian islands, etc., are implemented. Ms. Walfoort urged planners to design communities with freight in mind.

Morgantown Monongalia MPO—Morgantown, WV Region

Bill Austin is the Executive Director of the Morgantown Monongalia MPO and also serves as the chair of the West Virginia Association of MPOs. He thanked FHWA and MORPC for putting this workshop together. Morgantown is a high-tech area and is home to West Virginia University. The region has a large pharmaceutical presence and is one of the few growing areas in the State. Increased e-commerce activity is leading to friction in the community resulting from increased truck traffic for goods delivery. Regarding collaboration, three WV MPOs are working with each other and ODOT on creation of a statistical port that would serve all three metropolitan areas. For emerging technology, the MPO is looking ahead to understand the possible mobility and travel behavior changes resulting from advanced vehicle technologies. One of the key questions is what the vehicle miles traveled (VMT) and congestion impacts will be. Will automation lead to empty cars driving around, with a vehicle occupancy rate that will drop below 1.0? Mr. Austin said these are big questions; individually, we do not have answers, but together we can discuss the questions and identify possible answers. He suggested the workshop participants establish a workgroup to continue to talk about these issues.

Northeast Ohio Areawide Coordinating Agency (NOACA)—Cleveland Region

Lawrence Hall is NOACA's freight planner. In this capacity he collaborates with freight stakeholders in the private and public sectors to ensure the needs of the business community are being met. He also is involved with the NOACA Business Advisory Council and the Northeast Ohio Sustainable Communities Consortium. Downtown Cleveland has experienced a decline in population while the rest of the metropolitan area has held steady, resulting in sprawl and a declining economic base within the City of Cleveland. The MPO developed a regional freight plan, which has three key elements: facilitate all modes; prioritize maintenance and preservation; and mitigate congestion. The top freight need in the region is not a road project; it's a project to fix a wall on a key waterway that serves as a major freight route. Collapse of the wall would close the waterway, which would have large implications across the Great Lakes Region and beyond. This demonstrates the need to think multi-modally and coordinate across jurisdictions.

Mid-Ohio Regional Planning Commission (MORPC)—Columbus Region

Dina Lopez is MORPC's principal freight planner and works on a number of freight projects, including the Rapid Speed Transportation Initiative, which involves rapid speed passenger rail and Hyperloop connections between Chicago, Columbus and Pittsburgh. She also manages MORPC's Rickenbacker Area Comprehensive Study, which is developing a strategy to help position Central Ohio as a successful international logistics hub. Ms. Lopez discussed several

issues that are important to the larger Great Lakes Region, including a large CSX project, implementation of increased broadband and technology applications, and Hyperloop. These issues provide a great opportunity for everyone in the room to get together and collaborate. MORPC is deeply involved in these issues and is moving boldly forward. She is excited about the opportunity to share best practices about the work that is underway to maximize these efforts.

Q&A/Dialogue

Question for panel: What first- and last-mile issues do your regions experience with respect to e-commerce? These deliveries are not usually via large trucks; some are smaller trucks and others are personal vehicles, and may eventually be drone deliveries.

Answer from Ms. Lopez: Her expectation is that drone deliveries will take place primarily in rural and suburban areas rather than in denser cities. MORPC is collaborating with organizations that are conducting research on this.

Answer from Ms. Walfoort: The issue with delivery by vehicle is not specific to trucks but any vehicle that stops curbside and blocks traffic flow on local streets. This may not be a problem in every area but it can be a big issue in some neighborhoods.

Question for panel: How we can articulate the concept of multi-jurisdictional coordination to decision-makers? The workshop participants have bought into the concept, but most decision-makers are not on board because of competition between jurisdictions for the economic benefits of public and private investments.

Answer from Mr. Austin: In South Florida, there was a push to get three MPOs to merge. The State was forcing the issue, but there was a concern that each MPO would lose the voice of local decision-makers. A working group was formed, which eventually developed a community consensus and created a coordination mechanism that allowed them to stay separate but develop coordinated planning processes.

Answer from Mr. Hall: A Northeast Ohio Sustainable Communities Consortium was formed in 2011 by several MPOs, jurisdictions, and community partners to secure a Federal Sustainable Communities grant and develop a coordinated planning approach for land use, transportation, economic and workforce development, and infrastructure investments in the region.

Question for panel: It can be a challenge for MPOs to address freight needs. How can agencies balance the need for freight investments with the transportation needs of all other residents in a community?

Answer from Ms. Lopez: MORPC collaborates with organizations to apply for Federal grants such as TIGER and INFRA. A large component of the application process addresses first- and last-mile and other community issues such as accessibility. MORPC can bring the community's voice to the application process.

Answer from Mr. Austin: First- and last-mile issues occur in areas other than freight transportation. For example, hospitals are concerned with and are often required to have good access to arterials to allow emergency response vehicles to quickly reach residents.

PART 3—MOVING FORWARD

IDENTIFYING PRIORITY NEEDS AND POTENTIAL ACTIONS FOR THE REGION

In this session, the participants focused on common needs and potential next steps to keep the conversationgoing. Participants broke into small groups to identify common needs across the region and brainstorm priority needs, action items, and coordination approaches. They discussed the following questions in the small groups:

- What projects or programs could be implemented or improved through multi-jurisdictional partnerships or joint activities?
- What partnerships currently exist that we can build on?
- What are the common interests and common needs discussed today?
- What are possible actions this group can address?

REPORT OUTS AND KEEPING THE CONVERSATION GOING—DISCUSSION OF NEXT STEPS/ACTION ITEMS

Each break out group summarized their discussions and responses. Their answers are listed below by question, followed by additional comments.

<u>What projects or programs could be implemented or improved through multi-jurisdictional partnerships or joint activity?</u>

- Connected and autonomous vehicle partnerships.
- Agencies need incentives to engage in multi-jurisdictional coordination and need to more fully understand the benefits.
- At the Federal level, develop partnerships with the Department of Commerce to focus on workforce issues.
- Coordinate planning studies and efforts among MPOs along key corridors. FHWA can provide support for this effort.
- Coordinate State freight plans.
- Continued dialogue with the private sector on a broader regional basis rather than State by State.
- Alternative Fuels Corridor program.

<u>What partnerships currently exist that we can build on?</u>

- Mid-America Freight Coalition. Consider enhancing MPO involvement.
- Smart City partnerships.

- Connected and autonomous vehicle partnerships (e.g., Smart Belt Coalition).
- TPIMS truck parking project.
- MAASTO.
- AMPO and NARC.
- Regional or State freight conferences.

What are the common interests and common needs discussed today?

- Methods to prioritize freight projects across a scale larger than current boundaries.
- Harmonization of truck requirements across jurisdictions and interoperability of transportation technologies and ITS.
- Truck parking.
- Identification of the possible implications of advanced vehicle technology, and steps agencies need to take in the short term and the longer term to prepare themselves and their communities.
- Consideration of first- and last-mile issues when planning for freight on a large regional scale.
- Improving connectivity to ports and intermodal facilities for freight.
- Maintaining the region's waterways system.
- Workforce development, including truck driver shortage.
- Access to jobs and affordability.

What are possible actions this group can address?

- Keep meeting and talking with each other to share planning activities. Freight conferences provide an excellent means to get together in person (e.g., Ohio Conference on Freight). Other forums to discuss multi-jurisdictional issues include statewide MPO meetings and national conferences such as NARC and AMPO.
- Continue to support the established connected and autonomous vehicle partnerships that currently exist among organizations in the region to coordinate research and resources.
- Create an advisory committee across the region to focus on transportation investments and identify "low-hanging fruit" projects that have a large return relative to the investment.
- Hold more peer-to-peer events with the agencies that attended the workshop. Meet regularly, perhaps quarterly. These can focus on collaboration and communication to minimize competition for resources.
- Develop a regional/multi-State freight advisory committee.
- Review and compare State freight plans to identify common issues and priorities.
- Agencies across the Great Lakes Region can jointly develop grant applications for Federal award programs, or at least provide letters of support.

- Form a group to address oversize/overweight vehicles and permitting across the States, and pull in local agencies and the private sector as needed.
- Conduct outreach along key corridors to develop a common message about needs (freight, economic development, technology, etc.).

FINAL COMMENTS AND CLOSING REMARKS

During the workshop, the participants, hailing from the States of Michigan, Ohio, West Virginia, and central and Western Pennsylvania discussed freight planning efforts, emerging transportation technologies, and opportunities for multijurisdictional coordination. The speakers and attendees provided key feedback and consistent themes from the Workshop included:

- Collaboration on these important transportation issues is critical. Nothing happens without collaboration. Relationships are key; not only relationships between Government agencies, but also between the public, private, and academic sectors.
- We are facing a “perfect storm” of transportation challenges due to a strong economy, new technologies, and the rise of e-commerce and increased freight activity.
- A “new world” of technology has significant promise to meet today’s challenges, but is changing rapidly.
  - Policies and legislation are not fully in place and future technology platforms are unknown. Therefore, the risk is high.
  - This increases the need for collaboration between the public and private sectors and the need to be thoughtful about how we address technology issues so we avoid a patchwork of requirements and policies.
- A key question is: How do we prioritize needs and improvements across a large region?
- Participants are very interested in continued collaboration and coordination and believe it is important to keep this conversation going.

Ms. Walsh closed out the workshop by reminding the participants that this is the perfect time to talk about coordination in the region. It all starts by talking to each other and learning about the issues across the region and supporting each other’s projects. Coordination with the Federal Government also is necessary. She commended FHWA for bringing the group together and getting the conversation underway.

APPENDIX A: WORKSHOP AGENDA

Multi-Jurisdictional Coordination for the Great Lakes Region
FHWA Workshop Agenda

Hosted at the Ohio Department of Transportation in Partnership with MORPC

ODOT Auditorium—Lower Level
1980 West Broad Street
Columbus, OH 43223
February 22–23, 2018

DAY 1—Thursday, February 22, 2018

Part 1—Setting the Stage

Purpose Statement: This FHWA workshop brings together members of the public and private sectors to discuss how we can better connect and work with each other to address freight transportation and emerging technologies in the Great Lakes region (Michigan, Ohio, Pennsylvania, and West Virginia) and identify next steps for doing so.

8:00-8:30 a.m. **Registration and Materials Pickup**

8:30-8:45 a.m. **Welcome and Introductions**
Introductions by: *Spencer Stevens*, FHWA Office of Planning
- *Andrew Bremer*, Deputy Director of Strategic Initiatives and Programs, Ohio DOT
- *William Murdock*, Executive Director, Mid-Ohio Regional Planning Commission
- *Laurie Leffler*, Division Administrator, FHWA Ohio Division

8:45-9:15 a.m. **Starting the Conversation: Planning and Addressing Freight and Emerging Technologies across Jurisdictional Boundaries**
Overview of workshop goals and Questions and Answers session.
Introduction by: *Spencer Stevens*, FHWA Office of Planning
Speaker:
- *Catherine Ross*, Georgia Tech Center for Quality Growth and Regional Development

9:15-10:30 a.m. **Private Industry Perspectives on Transportation and Freight Needs**
Explore freight trends, market shifts, technology deployment, and challenges.
Introductions and facilitation by: *Tamiko Burnell*, FHWA Office of Operations and Freight Management
Speakers:
- *Mike Saneholtz*, Honda North America
- *Adrian Burns*, Columbus Chamber of Commerce
- *Bryant Thomas*, Norfolk Southern

10:30–10:45 a.m. **BREAK**

10:45-11:45 a.m. **Multi-Jurisdictional Collaboration and Building Partnerships**
Examine current collaboration activities to build upon.
Introductions and facilitation by: *Thea Walsh*, MORPC
Speakers:
- *Dorota Grejner-Brzezinska*, Ohio State University
- *Mark Compton*, Pennsylvania Turnpike

11:45-1:00 p.m. **LUNCH (Cafeteria on Site)**

Part 2—Current and Near-Term Multi-Jurisdictional Initiatives

1:00-2:00 p.m. **State DOT Perspectives on Freight, Emerging Technologies, and Multi-Jurisdictional Coordination**
Introductions and facilitation by: *Brandon Buckner*, FHWA Office of Planning
Speakers:
- *Elisha DeFrain*, Michigan DOT
- *Brian Hare*, Pennsylvania DOT
- *Mark Locker*, Ohio DOT

2:00-3:00 p.m. **Planning for Connected Vehicles and Autonomous Vehicles**
Introductions and facilitation by: *Egan Smith*, FHWA ITS Joint Program Office
Speakers:
- *Qiang Hong*, Center for Automotive Research
- *Randy Cole*, Ohio Turnpike Commission
- *Andrew Bremer*, Ohio DOT/DriveOhio

3:00-3:15 p.m. **BREAK**

3:15-4:15 p.m. **Emergence of Sustainable Smart Mobility in the Great Lakes Region**
Introductions and facilitation by: *Thea Walsh*, MORPC
Speakers:
- *Zack Huhn*, Venture Smarter
- *Scott Bernstein*, Center for Neighborhood Technology
- *Brandi Braun*, Deputy Innovation Officer, City of Columbus

4:15-4:30 p.m. **Brainstorm and Summary of Multi-State Efforts**
Facilitation by: *Catherine Ross*, Georgia Tech Center for Quality Growth and Regional Development

4:30 p.m. **ADJOURN**

5:30-7:00 p.m. **Smart Columbus Tour at The Columbus Idea Foundry**
421 West State Street, Columbus, OH
After workshop gathering and networking opportunity. The tour is approximately three miles from ODOT. Parking is available in a lot next to the facility or on-street.

DAY 2—Friday, February 23, 2018

8:30-8:45 a.m. **Recap of Day 1 and Overview of Day 2**
Speaker: *Brandon Buckner*, FHWA Office of Planning

8:45-10:00 a.m. **Metropolitan Freight Activities, Emerging Technologies, and Multi-Jurisdictional Coordination**
MPOs discuss freight and emerging technology challenges and opportunities.
Introductions and facilitation by: *James Garland*, FHWA Office of Planning
Speakers:

- *Robyn Bancroft*, Ohio-Kentucky-Indiana Regional COG
- *Sara Walfoort*, Southwestern Pennsylvania Commission
- *Dina Lopez*, Mid-Ohio Regional Planning Commission
- *Lawrence Hall*, Northeast Ohio Areawide Coordinating Agency
- *Bill Austin*, Morgantown Monongalia MPO

10:00-10:15 a.m. **BREAK**

Part 3—Moving Forward

10:15-11:30 a.m. **Identifying Priority Needs and Potential Actions for the Region**
Breakout groups identify common needs across the region and brainstorm priorities and coordination approaches.

11:30-12:15 p.m. **Report Outs and Keeping the Conversation Going—Discussion of Next Steps/Action Items**
Develop concrete action items to carry forward.
Facilitation by: *Catherine Ross*, Georgia Tech Center for Quality Growth and Regional Development, and *James Garland*, FHWA Office of Planning

12:15-12:30 p.m. **Final Comments and Closing Remarks**

- *Thea Walsh*, MORPC
- *Laurie Leffler*, FHWA Ohio Division

12:30 p.m. **ADJOURN**

APPENDIX B: GREAT LAKES REGION WHITE PAPER

The Great Lakes Region White Paper is included in the following pages.

February 2018

Multi-Jurisdictional Coordination for the Great Lakes Region

U.S. Department of Transportation
Federal Highway Administration

Great Lakes Region

February 2018

INTRODUCTION

This paper provides an overview of the Great Lakes Region and highlights key characteristics, including population, employment, transportation infrastructure, freight trends, challenges, and opportunities. For the purposes of this overview, the Great Lakes Region includes Michigan (MI), Ohio (OH), central and western Pennsylvania (PA) and West Virginia (WV). Past multi-State initiatives in the region have shown the benefits and challenges of multi-jurisdictional coordination. Some efforts have been explicitly transportation focused, while others have addressed different topics with a similar cooperative approach. Several examples are summarized in the final section.

The economic activity of the Great Lakes Region centers on several large metropolitan regions that serve as transportation and economic hubs. Major cities located in the region include Detroit and Grand Rapids, MI; Columbus, Cleveland, and Cincinnati, OH; Pittsburgh, PA; and Huntington and Charleston, WV. The Detroit region is the 13th largest metropolitan area in the United States in terms of gross domestic product (GDP), and is a major industrial center; Detroit is the largest city on the United States-Canada border, providing a link to the auto manufacturing industry with suppliers in the U.S. and Canada.[1] The Pittsburgh area has the 24th largest GDP, driven by financial services, professional and business services, and manufacturing. Table 1 presents the gross domestic product (GDP) for each of the four States and the gross metropolitan product (GMP) for the largest metropolitan statistical area (MSA) in each State. For Pennsylvania, GMP is provided for the central and western part of the State.

Table 1: GDP for Each State and GMP for the Largest MSA in Each State in the Great Lakes Region, 2015

State	2015 GDP (billion $)	Share	Largest MSA	2015 GMP (billion $)	Share
Michigan	472	2.6%	Detroit-Warren-Dearborn, MI	243	1.5%
Ohio	612	3.4%	Cleveland-Elyria, OH	127	0.8%
Pennsylvania	708	3.9%	Pittsburgh, PA	137	0.8%
West Virginia	73	0.4%	Huntington-Ashland, WV-KY-OH	15	0.1%
U.S. Total	**18,007**	**100%**	**U.S. Total**	**16,280**	**100%**

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

The abundant highway infrastructure in the four States of the Great Lakes Region accounts for 10.9 percent of the total national vehicle miles traveled (VMT). Michigan, Ohio, and West Virginia have above-average VMT per capita compared to national trends, as shown in Table 2. The below-average VMT per capita of Pennsylvania is likely a result of higher mode shares of transit and active travel modes in the State. The region's heavy reliance on automobiles calls for continuing efforts to build and maintain sustainable and resilient transportation infrastructure. This automobile reliance also reflects a need to encourage alternative travel modes in the region.

[1] U.S. Department of Commerce, Bureau of Economic Analysis, 2015.

Table 2: Total VMT and VMT per capita by State in the Great Lakes Region in 2013

State	Total VMT (millions)	National VMT Share	VMT per capita
Michigan	95,132	3.2%	9,853
Pennsylvania	98,628	3.3%	7,717
Ohio	112,767	3.87%	9,745
West Virginia	19,232	0.6%	10,376
Great Lakes Region, total	**325,759**	**10.9%**	**9,023**
United States, total	**2,988,323**	**100%**	**9,442**

Source: Bureau of Transportation Statistics.

IMPORTANCE OF MEGAREGIONS

The State, regional, and local jurisdictions in the Great Lakes Region comprise a megaregion. Megaregions are characterized as networks of urban centers and their surrounding areas, connected by existing economic, social, and infrastructure relationships.[2] Economic competitiveness is a key motivation for pursuing a megaregions and multi-jurisdictional approach to planning. According to the economic theory of agglomeration, organizations locate and invest in areas that allow them to take advantage of efficiencies due to proximity. These efficiencies may include a specialized labor force, robust infrastructure, research and development institutions, and a host of other reasons. This economic theory explains why, generally, larger regions attract a higher level of talent and corporate investment than smaller regions. Research suggests that clustering of industries and ability to make large-scale investments helps these larger regions become more economically competitive than individual cities or regions. Stated another way, megaregional planning and multi-jurisdictional coordination is based on the idea that the geographic units that are important to economic growth and development are not individual States or metropolitan areas, but agglomerations of regions that are bound together through business and economic interactions and dependencies.

Viewed through this lens, States and metropolitan areas with economic ties are stronger if they function as a region rather than as smaller independent units. This involves coordinated planning and decision-making across boundaries, and is the key justification for building ties among neighboring States and region. In an increasingly competitive global economy, it is critical to understand these economic ties and the transportation infrastructure that serves as the link within and between regions, and that provide connections across the U.S. and beyond.

In order to better understand the impact of megaregions and to facilitate cooperation and coordination accordingly, the Federal Highway Administration (FHWA) is sponsoring several workshops in megaregions across the country. These workshops unite local, regional, State, and Federal transportation officials together with the private sector to discuss how to address multimodal freight transportation, effective and efficient transportation infrastructure investment and operations, and corresponding shared economic success at the megaregion scale. The importance of this collaborative effort is underscored by the current and rising significance of these regions both nationally and globally. Megaregions are economic engines and also are major destinations and originators of travel.

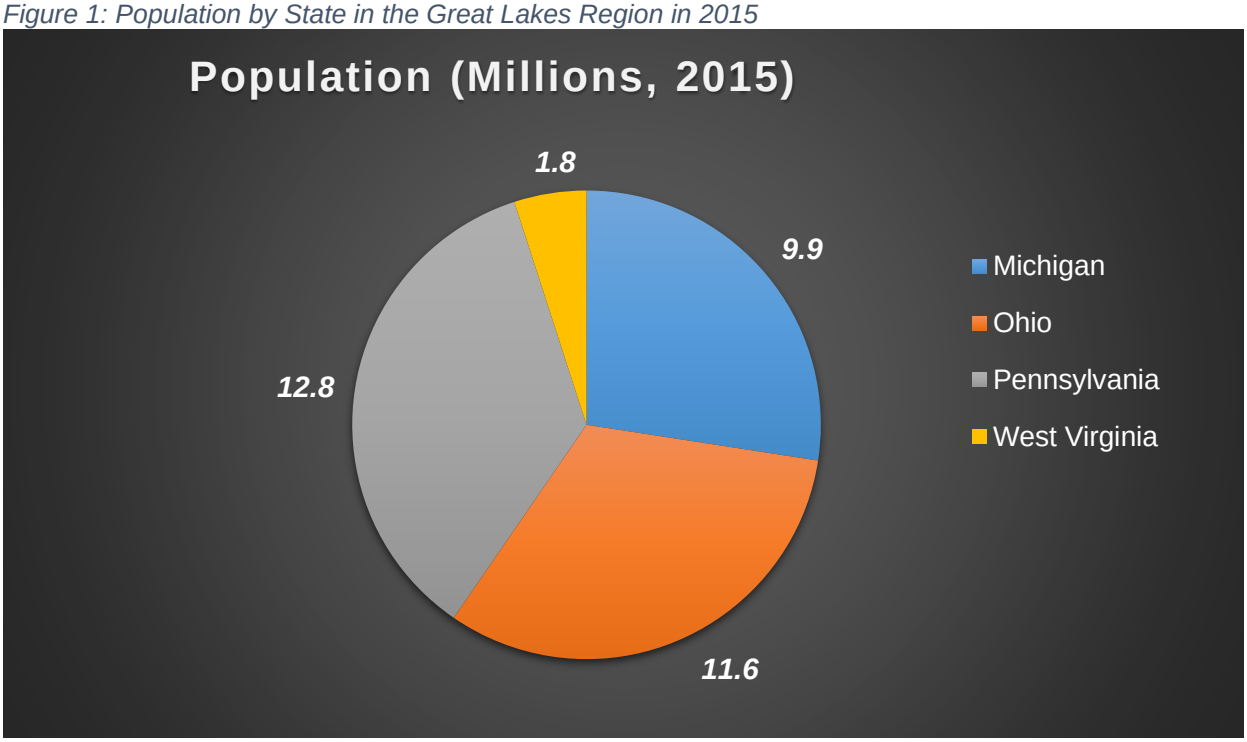
[2] Ross et al. (2009). Delineating Existing and Emerging Megaregions.

Transportation infrastructure provides the mobility within and between cities and metropolitan areas in the Great Lakes Region, and is the means for goods movement. The region's ports, highways, railroads, airports, pipelines and intermodal connections will need continued investment to transport agricultural produce, manufactured products and raw materials to their final destinations. Coordinated, comprehensive transportation planning activities are necessary to ensure that the region can effectively compete in the global economy. Decisions regarding transportation projects and priorities are made by local and State entities with support from appropriate Federal partners. Funding is coordinated by the 54 Metropolitan Planning Organizations (MPOs) located in the Great Lakes Region.[3]

POPULATION

The total population of the four States than span the Great Lakes Region was approximately 36.1 million people in 2015 (11 percent of the U.S. population).[4] Pennsylvania is the most populous State, followed by Ohio, Michigan, and West Virginia, as shown in Figure 1. The four States in the region have experienced slower growth between 2010 and 2016 than the Nation as a whole, with the population of West Virginia declining.[5] Population projections to 2030 show this trend continuing, with population increases of 1.4 percent for Michigan, 2.4 percent for Ohio, 2.9 percent for Pennsylvania, and—1.9 percent for West Virginia, compared to 16.9 percent for the U.S. as a whole.[6]

Figure 1: Population by State in the Great Lakes Region in 2015



Data source: U.S. Census Bureau.

[3] U.S. DOT (2017). Transportation Planning Capacity Building. Retrieved from https://www.planning.dot.gov/mpos1.asp.

[4] U.S. Census, 2015.

[5] U.S. Census, Annual Estimates of the Resident Population of the U.S., April 1, 2010 to July 1, 2016.

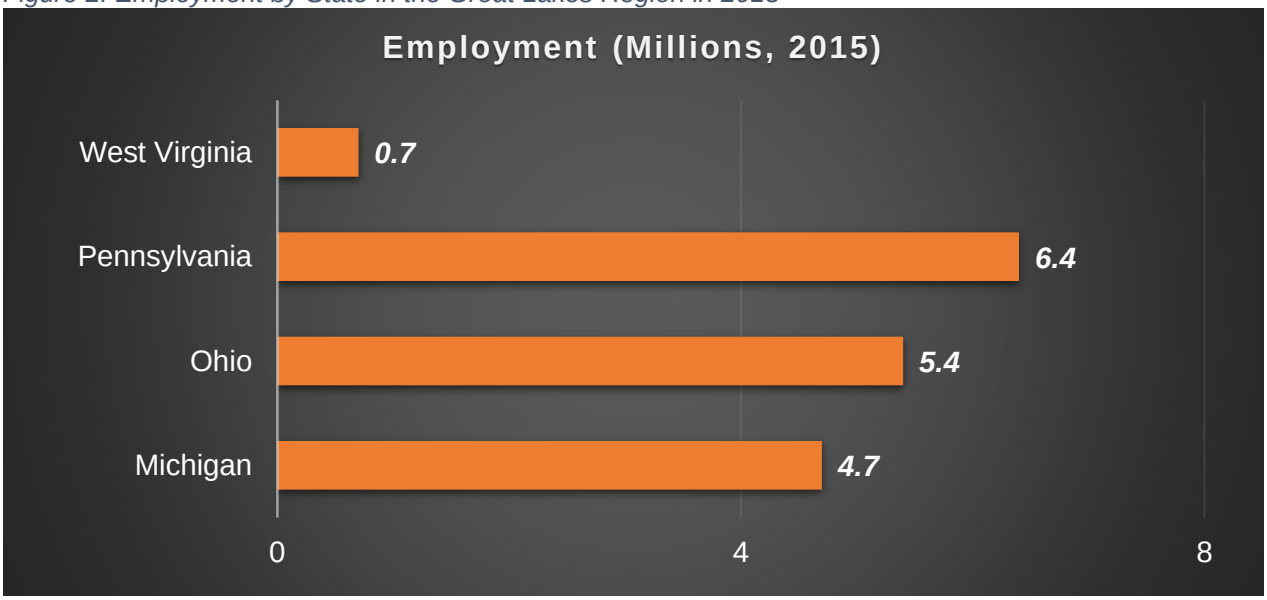
[6] University of Virginia Demographics Research Group, *National Population Projections*. http://demographics.coopercenter.org/national-population-projections/.

EMPLOYMENT

The region's largest employment sectors include agriculture, manufacturing, forestry, retail, healthcare and tourism. The region is supported by the world's largest fresh water lake system, which is relevant for farming, fishing, tourism, and inland water transport. Farmland produces a significant portion of the Nation's food supply. In addition, the management and enterprise sector, transportation, warehousing, and services also contribute to the region's economy. The region has seen some job loss in manufacturing due in part to the decline of the auto industry in the Midwest. The region also is home to many centers of technical and higher education that contribute to a well-trained, knowledgeable workforce.[7]

Employment for each State is shown in Figure 2. As the Great Lakes Region responds to reduced manufacturing, State and local officials are exploring other ways to grow and diversify their economy. The region's assets include a strong base in research and technology due to its leading public universities, innovation around advanced vehicle technologies, and the amenities inherent to the region from its location near the Great Lakes.[8]

Figure 2: Employment by State in the Great Lakes Region in 2015



Data source: U.S. Department of Labor, Bureau of Labor Statistics (2015).

GREAT LAKES REGION INFRASTRUCTURE

The Great Lakes Region has a large and developed network of freight and passenger transportation infrastructure across all modes. Figure 3 summarizes key transportation facilities. Each mode is discussed in more detail in the following sections.

[7] Delgado, E., Epstein, D., Joo, Y., Mann, R., Moon, S., Raleigh, C., Rhodes, E., & Rutzick, D. (2006). Through a Wider Lens: Re-envisioning the Great Lakes Mega Region.

[8] Ross, C. L. Spatial Planning in the U.S., Europe, and Asia (Unpublished Manuscript).

Figure 3: Key Great Lakes Region Transportation Facilities

Interstates	**I-64, I-68, I-69, I-70, I-71, I-74, I-75, I-76, I-77, I-78, I-79, I-80, I-81, I-83, I-84, I-86, I-90, I-94, I-95, I-96, I-99 (Auxiliary Interstates omitted)**
Railroads	Class I Freight: Canadian National, Canadian Pacific, CSX, Norfolk Southern Intercity Passenger: Amtrak
Commercial Airports	ABE, AVP, CAK, CLE, CMH, CKB, CRW, CVG, DAY, DTW, ERI, FNT, GRR, HTS, IPT, LBE, LCK, LUK, LWB, MGW, PIT, TOL, UNV, YNG
Waterborne	Ports of Alpena, Ashtabula, Bay City, Calcite, Cincinnati, Cleveland, Conneaut, Detroit, Drummond Island, Erie, Escanaba, Fairport, Huntington-Tristate, Huron, Lorain, Ludington, Marblehead, Marquette, Monroe, Muskegon, Penn Manor, Pittsburgh, Port Dolomite, Port Inland, Presque Isle, St. Clair, Sandusky, South Point, Stoneport, Toledo, Wellsville

Major Transportation Freight Flows

To support projected population and economic growth, freight movements across all modes in the U.S. are expected to grow by roughly 42 percent by the year 2040.[9] This steady growth is the result of the national economic trajectory, an increase in U.S. international merchandise trade, improvements in freight-sector productivity, and the availability of an extensive multimodal transportation network. With this increase, it is critical that rail and roadway connectivity be maintained and enhanced, and that the system remain in a state of good repair as infrastructure ages.

Freight movement in the Great Lakes Region is facilitated by all transportation modes. Table 3 displays total freight volumes by mode for each State in the region, totaling approximately 3.9 million kilotons. The highest volume of all freight is transported through Pennsylvania (34.5 percent), followed by Ohio (32.5 percent), Michigan, (22.5 percent), and West Virginia (10.5 percent), as depicted in Figure 4.

Table 3: Great Lakes Region Statewide Freight Tonnage (in kilotons, 2015)

	Truck	Rail	Water	Air	Other	Total
Michigan	529,647	142,546	53,051	412	151,105	876,761
Ohio	868,217	124,651	42,513	501	229,665	1,265,547
Pennsylvania	919,578	97,709	21,530	472	306,611	1,345,899
West Virginia	144,604	124,520	21,563	24	117,006	407,717
Total	**2,462,046**	**489,426**	**138,657**	**1,409**	**804,387**	**3,895,925**

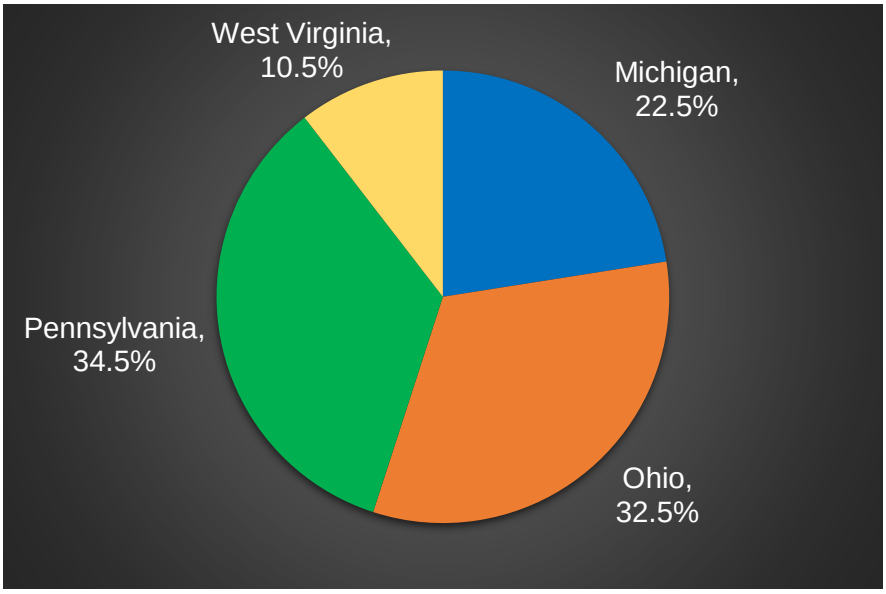
Note: Other includes multiple modes, pipelines, and "movements not elsewhere classified such as flyaway aircraft, and shipments for which the mode cannot be determined."[10]

Data source: Freight Analysis Framework version 4 (FAF4).

[9] National Freight Strategy Framework, https://ops.fhwa.dot.gov/freight/pol_plng_finance/policy/documents/nfsf/ssc3.htm.

[10] Bureau of Transportation Statistics. "Freight Analysis Framework Version 4 User's Guide for Release 4.0."

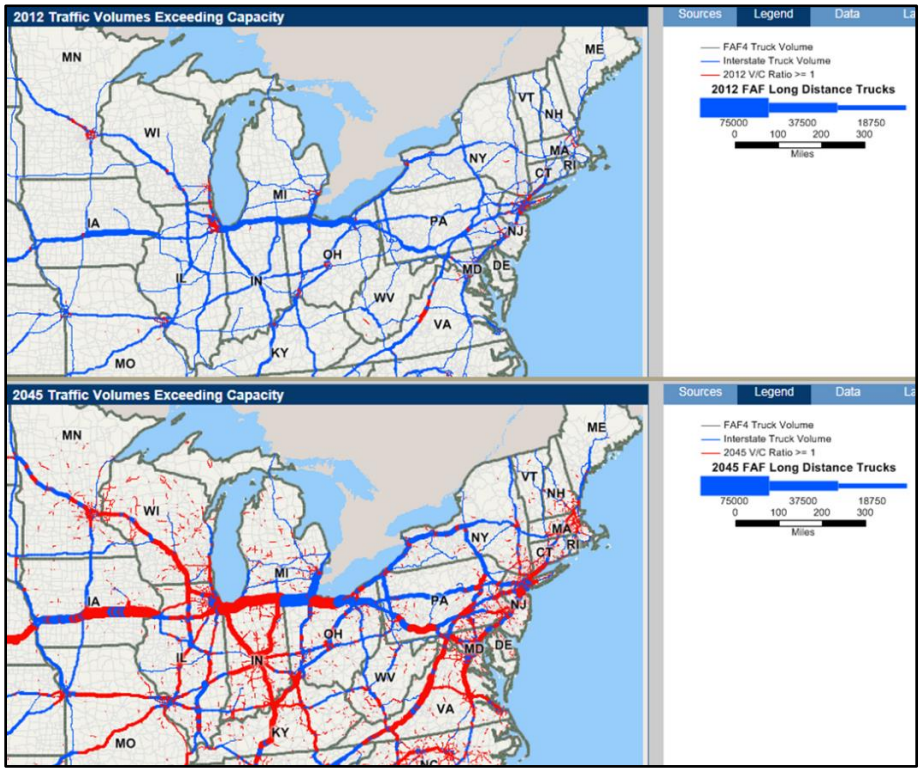
Figure 4: Percentage of Total Freight Volume by State in 2015



Data source: Freight Analysis Framework version 4 (FAF4).

Figure 5 presents 2012 truck volumes in the States in the Great Lakes Region as well as neighboring States and forecasts for 2045. Between 2012 and 2045, congested conditions (shown in red) are forecast to increase significantly, especially in States to the west of the region.

Figure 5: Great Lakes Region Truck Volumes, 2012 and 2045 Forecast



Source: Freight Analysis Framework version 4 (average annual daily truck traffic).

At the national level, six trends and challenges have been identified in the National Freight Strategic Plan (NFSP) developed by U.S. Department of Transportation (U.S. DOT).[11] These trends guide U.S. DOT's interest and efforts to help improve freight nationally. The trends include 1) expected growth in freight tonnage; 2) underinvestment in the freight system; 3) difficulty in planning and implementing freight projects; 4) continued need to address safety, security, and resilience; 5) increased global economic competition; and 6) the application and deployment of new technologies. Many of these trends also are present in the Great Lakes Region's freight profile and can help guide efforts to improve freight systems in the region.

The Fixing America's Surface Transportation (FAST) Act provided new tools to address freight challenges. The FAST Act establishes a new National Highway Freight Program (NHFP) with the goal of improving freight movement efficiency on the National Highway Freight Network (NHFN).[12] The FAST Act creates a national policy with specific goals about the freight network's condition, safety, security, efficiency, productivity, resiliency, and reliability. To receive funding under the NHFP, a State must develop a comprehensive freight plan that identifies freight planning activities, covers a five-year forecast period, includes a fiscally constrained "freight investment plan" with a list of priority projects, and describes how the State will invest and match its NHFP funds. NHFP funds can be used for a wide range of activities and projects that cover freight planning, analysis, and forecasting, infrastructure construction and rehabilitation, intelligent transportation system and technology deployment and so on. The Infrastructure for Rebuilding America (INFRA) discretionary grant program (previously called FASTLANE) also provides funds to repair aging infrastructure, with 25 percent of funds reserved for rural projects.[13]

The Great Lakes Region is home to a large number of manufacturing and distribution facilities. Manufacturing has grown significantly in recent years. The largest sectors are chemicals, petroleum and coal, and computers and electronics. The Dayton, OH area is one of the largest tooling, machining and material processing centers in the U.S. In Pennsylvania, the largest concentration of warehouse and distribution facilities are in and around the Lehigh Valley, which lies northwest of Philadelphia. Major distribution facilities operating in the Lehigh Valley include Amazon and Walmart, as well as several other online retailers. FedEx is building its largest warehouse and logistics hub in the U.S. near the Lehigh Valley International Airport, which is scheduled to open in 2018.

Pittsburgh and the surrounding 10-county region handles more than 201 million tons of freight across all modes, with a 40 percent growth in tonnage estimated by 2040.[14] The region is home to approximately 3,000 advanced manufacturing firms; many are focused on metals and machinery, with others supporting the energy, health care and life sciences, and information technology sectors. These firms are housed in a variety of workplaces, including new state-of-the-art buildings and older facilities that have been adapted for reuse. Many are located in suburban and rural markets close to major transportation routes.[15]

[11] U.S. DOT (2015). National Freight Strategic Plan. Retrieved from https://www.transportation.gov/freight/NFSP.

[12] National Highway Freight Program: https://www.fhwa.dot.gov/fastact/factsheets/nhfpfs.cfm.

[13] U.S. DOT (2017). Retrieved from https://www.transportation.gov/buildamerica/infragrants.

[14] Southwestern Pennsylvania Commission. *Southwestern Pennsylvania Regional Freight Plan*. 2016.

[15] Dewitt Peart. Pittsburgh Regional Alliance. *Pennsylvania's Pittsburgh Region: Keystone of Industrial Renaissance*. 2014.

In addition to manufacturing and logistics, the presence of the Marcellus shale play in the region and the natural gas boom also have had substantial economic impacts. Shell Oil is building a major petrochemicals complex on the banks of the Ohio River in Western Pennsylvania.

Growth in freight and economic development activity in these areas exerts strong economic and demographic effects not only within the Great Lakes Region but also throughout the Northeast, Mid-Atlantic, and beyond. Due in part to this rapid growth, transportation system impediments such as at-grade rail crossings, congestion, and bottlenecks have increased.

Highways

The Great Lakes Region is well served by Interstate Highways, State highways, and U.S. routes, which form a web-like network. There are more than 5,200 centerline Interstate miles in the region's four States, which is about 11 percent of the total U.S. Interstate system, and nearly 17 thousand miles of State highways and U.S. routes.[16] The highways converge around several metropolitan areas, which serve as ground hubs, including Detroit, MI; Cleveland, Columbus, and Cincinnati, OH; Pittsburgh, PA; and Charleston and Huntington, WV. Figure 6 depicts the region's National Highway System network.

Congestion on the region's roads accounts for approximately 497 million annual vehicle-hours of delay, of which 67 percent occurs in the 5 most congested regions: Detroit, Cincinnati, Cleveland, Pittsburgh, and Columbus. Congestion in the region is responsible for at least 249 million gallons of excess fuel burn, which roughly equates to an extra 4.8 billion pounds of CO_2 released annually.[17,18]

Within the region, Michigan shares a land border with Canada. Manufacturing and industrial production is very integrated across the border, with a combination of bridges, tunnels, and ferries. There are 3 truck crossing border locations in Michigan; Detroit, Port Huron, and Sault Ste. Marie. The Detroit, MI—Windsor, ON crossing is the busiest truck border crossing in North America, with more than 1.5 million truck crossings in 2015.[19] The Port Huron crossing also is among the busiest, with 778,000 truck crossings annually. Sault Ste. Marie experienced approximately 39,000 truck crossings in 2015.

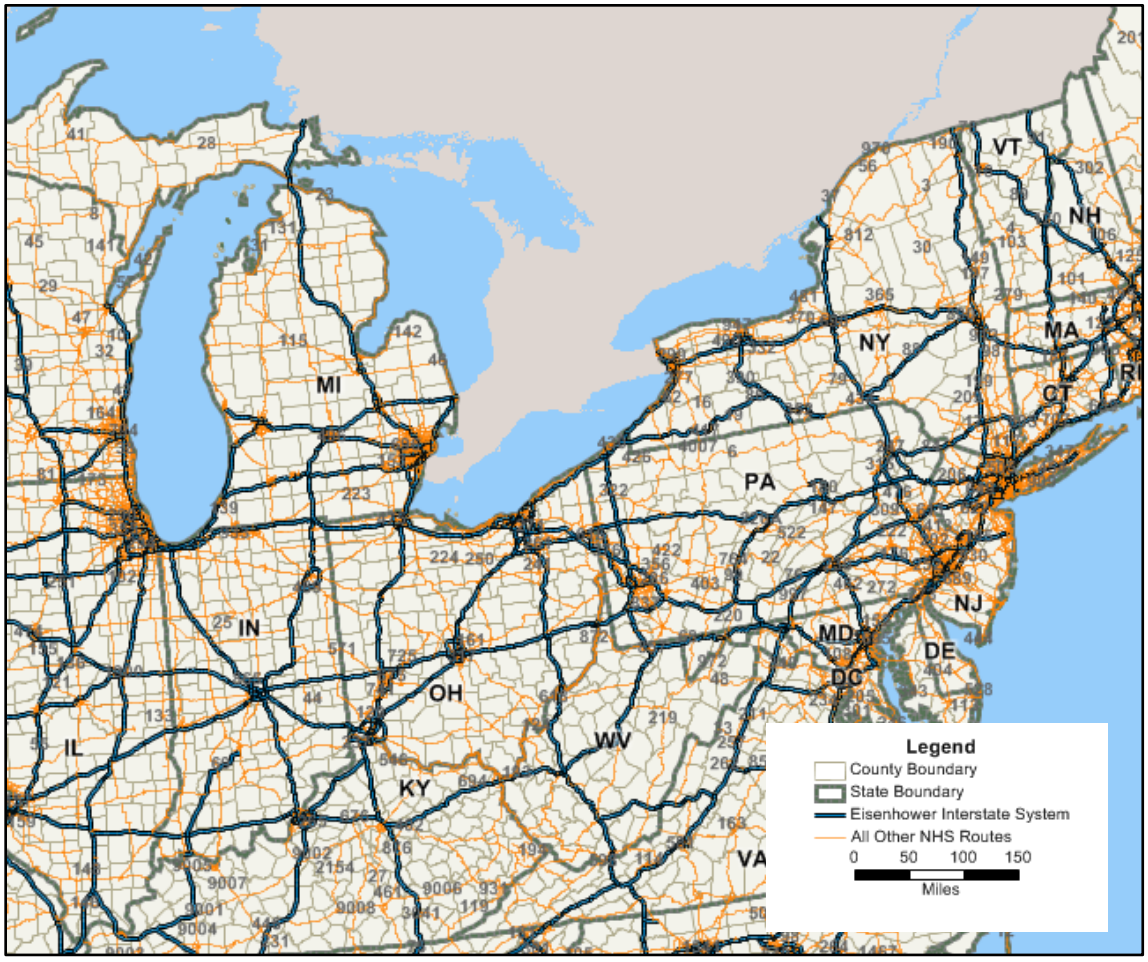
[16] FHWA Office of Highway Policy Information, Highway Statistics 2015.

[17] Texas A&M Transportation Institute (2015). Annual Urban Mobility Scorecard. Retrieved from https://mobility.tamu.edu/ums/.

[18] EPA (2017). Greenhouse Gases Equivalencies Calculator. Retrieved from https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references.

[19] http://osav-usdot.opendata.ArcGIS.com/.

Figure 6: Great Lakes Region National Highway System



Source: Federal Highway Administration (2015).[20]

Railroads

Railroads provide connectivity for passengers and freight movement across the country, linking cities with seaports along the Great Lakes and providing connections for barge traffic along the Inland Waterway System (IWS). Amtrak serves as the primary passenger rail service in the region, with routes operating in each of the four States and stops in numerous cities. The Class I freight railroads operating within the Great Lakes Region are Canadian National (CN), Canadian Pacific (CPRS), CSX Transportation (CSXT), and Norfolk Southern (NS). CSXT and NS routes throughout the region provide connectivity to major hubs along a larger freight rail network that extends from Florida to Maine, northwest and northeast into Canada, west beyond the Mississippi River, and east to Baltimore and other locations on the east coast. Figure 7 depicts the Class I railroad network in the region. Many of the goods consumed by metropolitan areas in the region, as well as throughout the Nation, are supplied by the surrounding rural regions and nearby ports. The Nation's economy depends on these reliable freight transportation connections to link businesses with suppliers and markets here and around the world.

[20] Retrieved from https://www.fhwa.dot.gov/planning/national_highway_system/nhs_maps/.

Intermodalism is one of the fastest-growing segments of the rail industry.[21] Manufacturers and suppliers increasingly rely on "just-in-time" delivery of goods, and intermodal rail service is suited to meet this demand. The region contains numerous rail intermodal centers that allow for goods transfer between modes. Harrisburg, PA is ranked ninth among U.S. metropolitan areas for intermodal volume, with Detroit/Pontiac, MI/Toledo, OH ranked 14th and Columbus/Marion/ Marysville, OH ranked 15th.[22]

Ohio has 13 intermodal railroad centers, which is second only to Illinois with 22 facilities. The CSX Northwest Ohio intermodal terminal, which opened in 2011, is referred to as the most technologically advanced, environmentally friendly intermodal terminal in North America.[23] West Virginia opened the Heartland Intermodal Gateway terminal in 2015. This is the first intermodal center in the State, and lies on the path of the Heartland Corridor, a public-private partnership between NS, West Virginia, Ohio, Virginia, and the Federal Government formed to create the fastest route for double-stack container trains moving between Virginia and the Midwest. In Michigan, Detroit has significant Interstate and international intermodal movements, with intermodal terminals handling North American traffic that originates and terminates in Canada, the United States and Mexico. Currently 6 intermodal terminals are located throughout Southeast Michigan. The Detroit Intermodal Freight Terminal (DIFT) project, a public/private collaboration between Michigan DOT, other Government agencies, and 4 Class I railroads, will expand and relocate terminals and improve highway and rail access, which will alleviate many current freight mobility issues.[24]

[21] Association of American Railroads. Rail Intermodal Keeps America Moving. April 2017. https://www.aar.org/wp-content/uploads/2018/05/AAR-Rail-Intermodal.pdf.

[22] Association of American Railroads, Analysis of 2014 STB Waybill Sample.

[23] Ohio Rail Development Corp. *Ohio's Intermodal Railroad Terminals.* https://www.dot.state.oh.us/Divisions/Rail/Documents/Ohio%27s%20Intermodal%20Railroad%20Terminals.pdf.

[24] Michigan DOT. *Michigan Freight Plan*. http://www.michigan.gov/mdot/0,4616,7-151-9621_68051—-,00.html.

Figure 7: Class I Railroads in the Great Lakes Region

Source: U.S. Bureau of Transportation Statistics (2015).

Inland Waterways and Ports

The U.S. inland waterways system includes approximately 12,000 miles of commercially navigable water channels that move commerce to and from 38 States. These waterways enhance the Nation's surface transportation system in several ways: increase the state of good repair of the system by reducing maintenance costs from wear and tear on roads and bridges; provide additional freight and passenger transportation capacity; often use less energy per ton-mile of freight moved; provide alternatives for the movement of hazardous materials outside heavily populated areas; and increase transportation system resiliency and redundancy by providing transportation alternatives during times of disaster or national emergency.[25] The U.S. Department of Transportation has designated 24 all-water Marine Highway Routes. Figure 8 shows the designated Marine Highway Routes for the eastern part of the U.S., including those serving the region.

The Great Lakes Region has extensive access to the inland waterway system. Commodities travel to and from the region via many waterway links, including the Great Lakes, Detroit River, Mississippi River, Missouri River, Ohio River, Tennessee River, Delaware River, Allegheny

[25] U.S. DOT Maritime Administration, *America's Marine Highway Program.* https://www.marad.dot.gov/ships-and-shipping/dot-maritime-administration-americas-marine-highway-program/.

River, and the Monongahela River. The Great Lakes Seaway Navigation System enables navigation between the Great Lakes, allowing passage from the Atlantic Ocean to the inland port of Duluth on Lake Superior, a distance of more than 2,300 miles. This system and its component waterways connect ports in the region to external seaports.[26] Nationally, inland waterway travel along the Ohio River follows the U.S. DOT Maritime Administration M-70 Marine Highway Corridor, which begins in Pittsburgh and links to the M-55 Marine Highway Corridor (the Mississippi River System) near St. Louis, Missouri, providing waterborne connectivity for the region to the upper Midwest and Canada as well as southern U.S. and points west of the region. Key truck and rail corridors along these Marine Highway Corridors experience congestion and bottlenecks. Increased use of the waterways can remove barriers to efficient freight transportation and has the potential to alleviate a portion of the truck and rail congestion. Table 4 shows the major ports of the region.

Table 4: Major Ports in the Great Lakes Region

Port Name	State	2015 Tonnage (millions)	Port Name	State	2015 Tonnage (millions)
Alpena	Michigan	2.2	Toledo	Ohio	8.8
Calcite	Michigan	5.9	Sandusky	Ohio	3.0
Detroit	Michigan	13.0	Marblehead	Ohio	3.6
Drummond Island	Michigan	1.1	Lorain	Ohio	0.8
Escanaba	Michigan	3.8	Cleveland	Ohio	11.5
Marquette	Michigan	1.0	Fairport Harbor	Ohio	1.5
Monroe	Michigan	2.4	Ashtabula	Ohio	5.0
Muskegon	Michigan	1.5	Conneaut	Ohio	4.8
Port Dolomite	Michigan	3.1	Cincinnati	Ohio	11.7
Port Inland	Michigan	4.0	Pittsburgh	Pennsylvania	32.7
Presque Isle	Michigan	7.8	Marcus Hook	Pennsylvania	11.9
St. Clair	Michigan	7.2	Chester	Pennsylvania	1.3
Stoneport	Michigan	6.3	Philadelphia	Pennsylvania	26.0
Huntington—Tristate	West Virginia	46.8	Penn Manor	Pennsylvania	2.6

Data Source: National Transportation Atlas Database.[27]

[26] Bureau of Transportation Statistics, 2015.

[27] Retrieved from https://www.bts.gov/geospatial/national-transportation-atlas-database.

Figure 8: Marine Highway Routes Serving the Great Lakes Region

Source: U.S. DOT Maritime Administration.

Airports

The region has several airports serving large cargo and passenger volumes. While the weight of goods moved by air nationwide is much lower than for surface modes, their value is very high since the goods that move by air freight tend to be very time-sensitive or high-value items, like electronics or pharmaceuticals. The largest airports in the region are Detroit Metropolitan (DTW), Pittsburgh International (PIT), Cleveland Hopkins International (CLE), John Glenn Columbus International (CME) (passenger volume), Rickenbacker International (LCK) (cargo volume), and Cincinnati/Northern Kentucky International (CVG).[28]

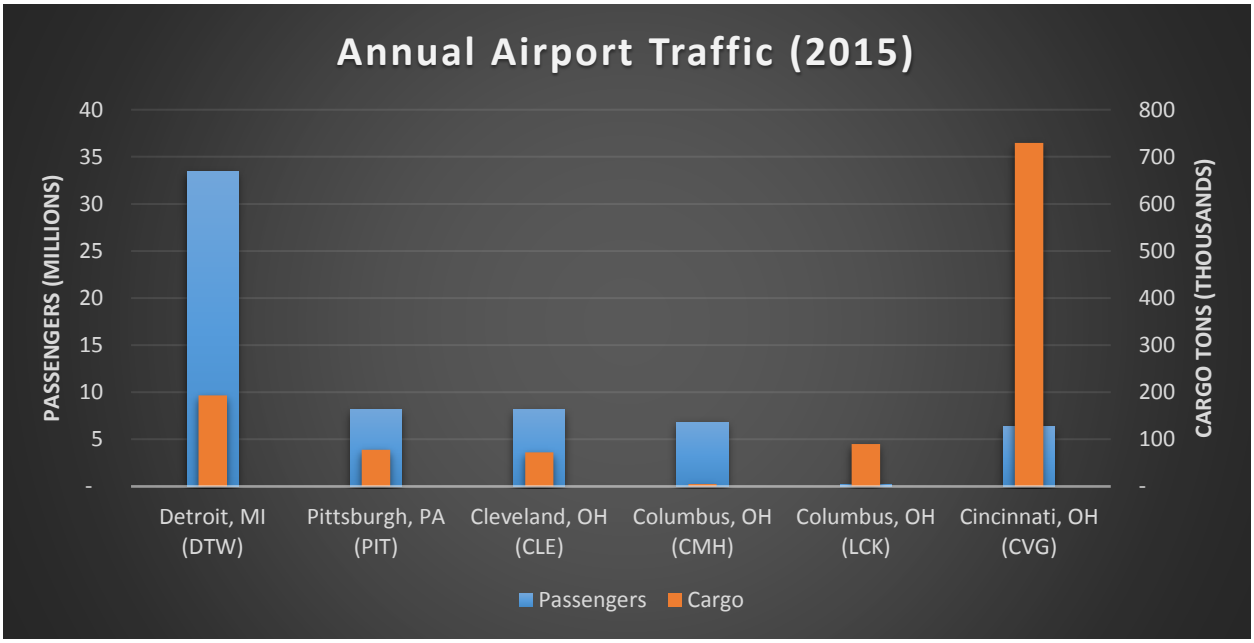
Figure 9 summarizes the passenger and cargo traffic at these six airports. CVG processes the largest cargo volume. Cargo volume at CVG increased more than 50 percent since 2011. The airport is the fastest growing cargo airport in North America, and is the eighth largest cargo airport in North America and the 34th largest in the world.[29] DTW has the second largest cargo volume and the highest passenger volume by far in the region; the airport is the 19th largest passenger airport in North America and the 28th largest cargo airport. LCK in Columbus is

[28] Airports Council International. *2015 North America Airport Rankings*. http://www.aci-na.org/north-america-airport-rankings.

[29] Cincinnati/Northern Kentucky International Airport. January 2017. http://www.aviationpros.com/press_release/12297421/cvg-experiences-continued-passenger-and-cargo-growth-in-2016.

primarily a cargo airport with runways capable of handling the world's largest aircraft. The facility is continuously open for service, connecting the region to air cargo hubs in Asia, Europe, and the Middle East. It sits within the Rickenbacker Inland Port, which has more than 70 million square feet of warehouse and distribution space and is adjacent to the Norfolk Southern Rickenbacker Intermodal Terminal.

Figure 9: Great Lakes Region Major Airports Annual Traffic in 2015



Source: Airports Council International—North America (2015).[30]

GREAT LAKES REGION CHALLENGES

Congestion: Limited capacity and high demand has contributed to increased and growing congestion in many parts of the region, especially the urban cores where much of the transportation infrastructure converges. Figure 10 shows the most congested regions in terms of delay and annual congestion cost per commuter. The largest regions (Detroit and Cincinnati) predictably experience the highest absolute economic costs due to lost time and wasted fuel during traffic jams. However, these costs are borne on a similar scale to residents in many of the medium-sized cities in the region.

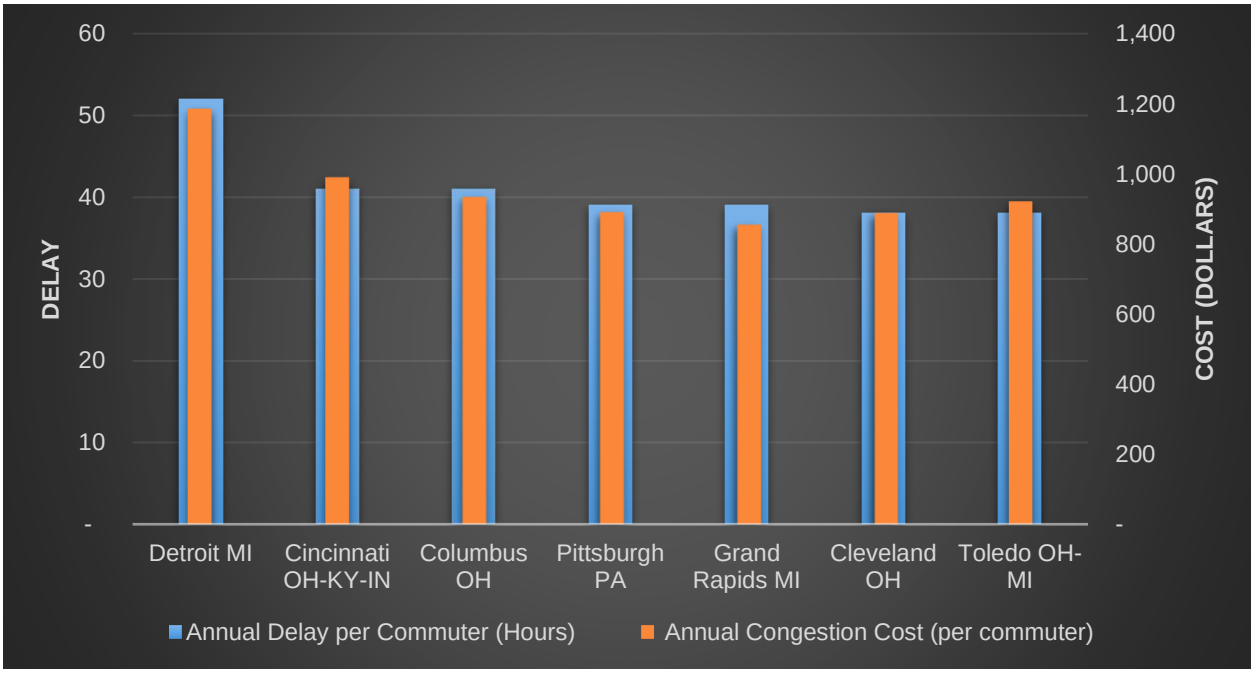
Trucks and freight are stuck in the same congestion. Table 5 presents truck bottlenecks in the Great Lakes Region and the national ranking for each. Cincinnati is home to the 5th highest ranking bottleneck, as well as 3 others in the top 100. Infrastructure capacity constraints and the need to operate and maintain existing infrastructure call for the careful evaluation, inventory, and strategic decision-making that emerge from interregional collaboration and coordination.

Truck Parking: Many areas of the region see demand for truck parking frequently surpass supply, which interferes with drivers taking mandatory rest or encourages them to stop in undesignated parking areas, such as highway shoulders or ramps. Parking is supplied by a combination of public sources (e.g., rest areas) and private sources (e.g., commercial truck stops). The region is attempting to lessen the truck parking shortage through a $25 million

[30] Retrieved from http://www.aci-na.org/content/airport-traffic-reports.

TIGER Grant awarded in 2015 to provide real-time truck parking information.[31] Similarly, the National Coalition on Truck Partnership, an association among U.S. DOT and several trucking and transportation organizations, hosted a Midwest regional meeting in 2016 that sought to identify potential sites (e.g., brownfields and weigh stations) that could serve as parking during peak demand.[32]

Figure 10: Most Congested Regions in the Great Lakes Region, 2015



Source: Texas A&M Transportation Institute (2015).[33]

Table 5: Truck Bottlenecks in the Great Lakes Region and National Ranking

National Rank	Location	State
5	Cincinnati, OH: I-71 at I-75	OH
31	Port Huron, MI: I-94 at I-69	MI
35	Cincinnati, OH: I-75 at I-74	OH
42	Detroit, MI: I-94 at I-75	MI
50	Dayton, OH: I-75 at U.S. 35	OH
61	Pittsburgh, PA: I-70 at I-79 (West)	PA
67	Columbus, OH: I-71 at I-70	OH
70	Detroit, MI: I-75 at I-696	MI
84	Cincinnati, OH: I-75/I-71 at I-275	OH
96	Pittsburgh, PA: I-70 at I-79 (East)	PA

[31] Delong, K. (2015). Retrieved from http://fox6now.com/2015/10/29/wisconsin-part-of-25-million-Federal-grant-for-midwest-truck-parking-information-system/.

[32] FHWA (2017). National Coalition on Truck Parking. Retrieved from https://ops.fhwa.dot.gov/publications/fhwahop17026/index.htm#s3.

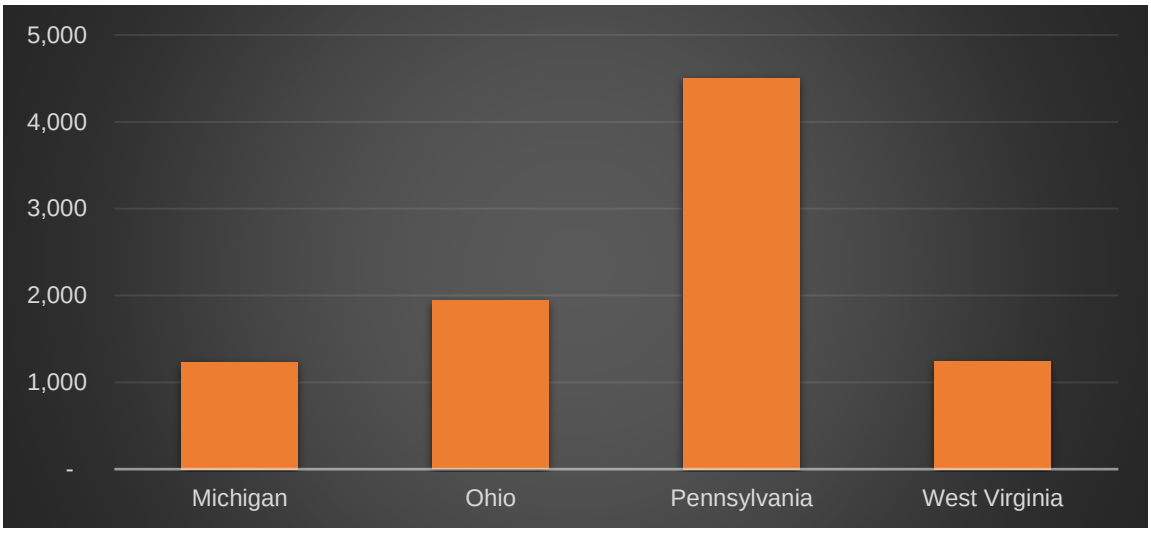
[33] Retrieved from https://mobility.tamu.edu/ums/congestion-data/.

Data Source: American Transportation Research Institute, 2017 Top 100 Bottleneck List.[34]

Maintenance and State of Good Repair: Maintaining infrastructure's state of good repair is a challenge in the region as it is in the rest of the country, especially as transportation funding does not keep pace with infrastructure age. MAP-21 set a National goal to "maintain the highway infrastructure asset system in a state of good repair" and requires States, MPOs, and public transportation providers to transition to a performance-based planning and programming process to achieve this goal. State of good repair matters not just for operations but also for budgets since systems maintained in a state of good repair achieve the lowest annual costs for maintenance over an extended timeline. Structurally deficient bridges "require significant maintenance, rehabilitation or replacement."[35] Structurally deficient bridges have received lots of attention due to their sheer number and their location in all parts of the country. The percentage of bridges that are structurally deficient in the Great Lakes Region ranges from a low of 7 percent to a high of 25 percent depending on the state.[36,37] Each State within the Great Lakes Region has 1,000 structurally deficient bridges or more (Figure 11).

The region also has a large system of inland waterways and locks that transport bulk freight goods. Similarly, airport facilities requiring maintenance include not just terminals and runways, but also navigation aids, weather reporting tools, lighting, and pavement. Much of this infrastructure will require additional, reliable funding sources to maintain them or upgrade them to new Federal standards.

Figure 11: Structurally Deficient Bridges in the Great Lakes Region



Source: Federal Highway Administration (2016).[38]

Data and Funding: Asset management must be part of the response to the deficiencies in state of good repair, but it also faces its own challenges of having the data, methods, and decision process in place to prevent infrastructure condition from falling below standards, and raising

[34] Retrieved from http://atri-online.org/2017/01/17/2017-top-100-truck-bottleneck-list/.

[35] ASCE (2017). Retrieved from https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Bridges-Final.pdf.

[36] ASCE (2017). Infrastructure Report Card 2017. Retrieved from https://www.infrastructurereportcard.org/state-item/ohio/.

[37] ASCE (2015). Infrastructure Report Card 2015. Retrieved from https://www.infrastructurereportcard.org/state-item/pennsylvania/.

[38] Retrieved from https://www.fhwa.dot.gov/bridge/nbi/no10/defbr16.cfm.

sufficient maintenance funds. Much progress has been made in terms of data management and availability. Beyond the sheer quantity of data and infrastructure, the further challenge will be in funding, especially in places that have had to defer maintenance, during which time costs have compounded. Meeting maintenance needs will be very difficult since many States in the region have insufficient funds to maintain infrastructure when all funding sources are combined.[39] Federal and State gasoline taxes have normally not kept pace with infrastructure needs, aging infrastructure, inflation, or vehicle fuel economy standards.

GREAT LAKES REGION OPPORTUNITIES

The megaregion concept provides a new framework for identifying and addressing mobility and economic development challenges and opportunities across traditional, jurisdictional lines. This framework considers not only existing political boundaries, but also the spatial level at which planning should be conducted to maximize opportunities arising from agglomerations of economic activity and population. This involves coordinated planning and decision-making across boundaries for the mutual benefit of residents across a megaregion. Planning across these boundaries is difficult, but it is receiving renewed attention at State, local, and Federal levels.

This framework also is a tool to achieve the U.S. DOT's Strategic Goals recently released in U.S. DOT's Draft Strategic Plan, which reflects the Secretary's priorities for Fiscal Years 2018 through 2022.[40] The four Strategic Goals are:

- **Safety:** Reduce Transportation-Related Fatalities and Serious Injuries Across the Transportation System.
- **Infrastructure:** Invest in Infrastructure to Ensure Mobility and Accessibility and to Stimulate Economic Growth, Productivity and Competitiveness for American Workers and Businesses.
- **Innovation:** Lead in the Development and Deployment of Innovative Practices and Technologies that Improve the Safety and Performance of the Nation's Transportation System.
- **Accountability:** Serve the Nation with Reduced Regulatory Burden and Greater Efficiency, Effectiveness and Accountability.

To accomplish these Goals, the Plan identifies several strategies that align with the multi-jurisdictional coordination approach inherent in megaregional planning. Specific strategies include: strengthening coordination across modes, stakeholders, jurisdictions, institutions, sectors, and international boundaries; partnering with the private sector to encourage technology innovation; supporting projects of national significance that leverage Federal funds, transform how infrastructure is delivered, and promise a high rate of social and economic return; making targeted investments to increase freight mobility and reliability in support of economic competitiveness; facilitating private-sector and multimodal stakeholder collaboration to improve transportation safety and performance; and targeting Federal investments toward transportation projects that address high-priority infrastructure needs.

[39] ASCE (2017). 2017 infrastructure report card: State by state. Retrieved from http://www.infrastructurereportcard.org/state-by-state/.

[40] U.S. DOT Strategic Plan for FY2018-2022, Draft for Public Comment. Oct. 19, 2017. https://www.transportation.gov/dot-strategic-plan.

The power of a megaregional planning framework is that it is flexible; it can be adapted to particular issues and regions; it can involve short-term or long-term partnerships; and it can involve informal or formal working agreements. This approach enables FHWA and the State, local, and regional agencies and their partners in the Great Lakes Region to work together to achieve the U.S. DOT's strategic goals. Several opportunities for collaboration in the Great Lakes Region are described below.

Partnerships and Coordination

The region's intricate highway network already has prompted interagency coordination across jurisdictional boundaries. For example, the **Great Lakes Regional Transportation Operations Coalition** (GLRTOC) is a partnership that has been established in the region to "collaborate to improve cross-regional transportation operations in support of regional economic competitiveness and improved quality of life." Transportation agencies from Michigan and Ohio are members, along with agencies from Minnesota, Wisconsin, Illinois, Indiana, Iowa, and the Canadian province of Ontario. GLRTOC has identified specific corridors to test new types of coordination among the transportation agencies.

The **Truck Parking Information and Management System (TPIMS) Project** is a multi-State collaboration involving Michigan and Ohio along with Indiana, Iowa, Kansas, Kentucky, Minnesota, and Wisconsin, funded by a $25 million Transportation Investment Generating Economic Recovery (TIGER) grant and additional funds from each State. TPIMS will reduce the time commercial truck drivers spend searching for parking along major freight corridors. TPIMS will allow drivers to monitor parking availability and make decisions as they near the limit of their federally mandated hours of service. The project will be operational in 2019.

Another important opportunity in the region is demonstrated in the work of the **Mid-America Freight Coalition (MAFC)**, which is an organization of 10 States, including Michigan and Ohio, that cooperate in the planning, operation, preservation, and improvement of transportation infrastructure in the Midwest. The MAFC has taken a leadership role in addressing the requirements of the FAST Act with regards to freight corridors. Specifically, the MAFC completed a survey to determine member States' progress in designating critical freight corridors.[41] The preliminary findings from the survey illustrate that States are in different stages of corridor selection, and also have taken diverging approaches to designation. Greater coordination across the region will can encourage systematic plans to improve freight infrastructure and connectivity.

The **Conference of Great Lakes and St. Lawrence Governors and Premiers** is an organization of chief executives from Michigan, Ohio, Pennsylvania, Illinois, Indiana, Minnesota, New York, Ohio, and Wisconsin, along with the Canadian provinces of Ontario and Québec. Through the Conference, the Governors and Premiers work together to grow the region's economy. The Conference builds upon work by the Council of Great Lakes Governors to encourage and facilitate environmentally responsible economic development. In 2015 the Great Lakes and St. Lawrence Governors and Premiers released a regional strategy to jump start the Great Lakes-St. Lawrence maritime transportation system. Once fully implemented, the strategy will help grow the region's maritime sector. The group also developed a list of regional priorities to improve the Maritime System.

[41] http://midamericafreight.org/wp-content/uploads/MAFC-CRFC-and-CUFC-Summary-Tables-10172016.pdf.

Transportation Technology

The **Smart Belt Coalition** is a partnership between Michigan DOT, Ohio DOT, the Ohio Turnpike and Infrastructure Commission, Pennsylvania DOT, and the Pennsylvania Turnpike Commission to collaborate on research, testing, policy, funding, and deployment of Automated and Connected Vehicle (ACV) technology. The Coalition also consists of six affiliate members: the University of Michigan, American Center for Mobility, Kettering University, the Ohio State University, Transportation Research Center, and Carnegie Mellon University. The State agencies are responsible for guiding research, development, and deployment of smart technologies, while the affiliate members are responsible for conducting research efforts. The Coalition developed a Strategic Plan that focuses on three key areas: work zones, traffic incident management (TIM), and freight. Immediate project priorities include a Work Zone Reservation and Traveler Information System (WZRTIS) and Truck Platooning. Future priorities include the Response, Emergency Stating and Communications, Uniform Management, and Evacuation Program (R.E.S.C.U.M.E.), the Intelligent/Connected Work Zone Devices Project, and additional work on the Truck Parking Information and Management Project.

Ohio DOT is working on the **Route 33 Smart Mobility Corridor**, a 35-mile segment of U.S. Route 33 between Dublin and East Liberty, OH, that will be used as a testing ground for ACV. The highway will be equipped with fiber optic cables and wireless sensors that will enable communication between vehicles and infrastructure. The sensors also will collect data instantaneously, which will improve traffic management by providing more accurate travel flow data, weather conditions, and incident management data. The Route 33 Smart Mobility Corridor is will demonstrate how technology can impact both urban and rural mobility as well as personal and goods movement, and shed light on issues surrounding the integration of automated and human-operated vehicles, which has been cited as a major safety concern amongst the public and decision-makers.

Hyperloop One is a startup company whose vision is to connect cities through extremely high-speed transportation of people and freight and has developed a high-speed tube transportation system. The company has selected a 488-mile Chicago-Columbus-Pittsburgh route as 1 of 10 sites for consideration for development of its system. The system would provide a direct connection between the 3 cities, which currently does not exist on a rail system.

FHWA is establishing **Alternative Fuel Corridors** for vehicles that are fueled with compressed natural gas, electricity, hydrogen, liquefied natural gas (LNG), and liquefied petroleum gas (LPG). These corridors have alternative refueling sites along a designated route on the National Highway System. Some routes are in the region have been established, while others are pending while waiting for additional facilities.

One of the areas of opportunity to overcome capacity constraints is **Intelligent Transportation Systems** (ITS). ITS measures can address many of the problems that come with overcrowded infrastructure, such as safety or emergency vehicle access. Moreover, they may even help make more efficient use of existing infrastructure through such measures as better traffic light sequencing or driver communication, effectively increasing capacity without pouring concrete. It also can help truck drivers find available parking spaces before hours of service regulations require them to stop driving, helping them rest in a safe location. Information systems to help truck drivers find parking already is a point of cooperation among most States in the region through the 2015 TIGER Grant that they received for that purpose, and which can serve as a launching pad for other truck parking measures.

In 2016, the City of Columbus won the **Smart City Challenge** award from U.S. DOT. This included $40 million in Federal funding with an additional $100 million from private-sector matches. Columbus' application emphasized enhanced access to jobs, education, and services in low-income communities. Strong partnerships with business and academic stakeholders also contributed to the win. The Smart City funding will go towards innovative projects that enhance communication between vehicles, people, and infrastructure to efficiently manage the flow of people and goods throughout the City. Columbus will begin developing a smart corridor that will use integrated, real-time data to manage traffic, enhance BRT service, and enable ACV operations. ACVs also will serve as a first-last mile connections to transit. Integrated, real-time data will be used to optimize freight movement through truck platooning and dynamic routing. A Smart Grid project also is planned, which will provide the City with alternative energy to fuel electric vehicle charging stations.

Passenger Rail

There is an existing interest in developing passenger high-speed rail in the region and beyond. An example is the proposed line from Pontiac, MI to Detroit, Ann Arbor, and Battle Creek, among other Michigan cities, and northwest Indiana and Chicago, IL. The line would connect Detroit with Chicago in approximately three-and-a-half hours.[42] Another larger cooperative initiative is the Midwest Interstate Passenger Rail Commission, which was created by Interstate compact in 2000. Specific proposals have changed and continue to evolve in line with economic and political priorities, but the Commission's work towards a developed passenger rail network covering nine States, including those in the region, has continued.[43]

Great Lakes Region stakeholders and partners in neighboring States recently convened to support the Midwest Regional Rail Planning Study (MWRRP). The study aims to build on current rail planning efforts within the 12 States of Illinois, Missouri, Iowa, Michigan, Wisconsin, Ohio, Nebraska, Kansas, South Dakota, North Dakota, Indiana, and Minnesota and to develop a comprehensive vision for integrated regional passenger rail in the Midwest. The study advances planning, procurement, and governance models. The project, led by the Federal Railroad Administration (FRA), began in the spring of 2017.[44]

[42] MDOT (2017). Chicago—Detroit/Pontiac passenger rail corridor program. Retrieved from http://www.michigan.gov/mdot/0,4616,7-151-9621_11058_74869—-,00.html.

[43] MIPRC. Retrieved from http://miprc.org/.

[44] FRA (2017). Midwest Regional Rail Plan. Retrieved from https://www.midwestrailplan.org/.

APPENDIX

Megaregion Studies, Plans, and Freight Plan Resources

1. Great Lakes Regional Transportation Operations Coalition (GLRTOC) Partnership Statement. http://www.glrtoc.org//wp-content/uploads/2015/01/glrtoc_partnership_20110208v2.pdf
2. Improving Cross-Regional Transportation. http://www.glrtoc.org//wp-content/uploads/2015/01/GLRTOC_Flyer_2013.pdf
3. Literature Review of Organizational Structures and Finance of Multijurisdictional Initiatives and the Implications for Megaregion Transportation Planning in the U.S. FHWA. 2011. https://www.fhwa.dot.gov/planning/megaregions/reports/megaregions_report_2011
4. Metropolitan Planning Organizations and Transportation Planning for Megaregions. FHWA. 2014. https://www.fhwa.dot.gov/planning/megaregions/reports/mpo_and_transportation_planning
5. Michigan DOT. Michigan Freight Plan. http://www.michigan.gov/mdot/0,4616,7-151-9621_68051—-,00.html
6. Mid-American Association of State Transportation Officials (MAASTO) Truck Parking Information and Management System (TPIMS) Partnership. http://trucksparkhere.com/wp-content/uploads/2017/02/TPIMS-MAASTO_Factsheet_MAASTO-TPIMSPartnerships_2016-06-29v2-2.pdf
7. Midwest Regional Rail Planning Study. FRA. https://www.midwestrailplan.org
8. Ohio DOT. Transport Ohio—Statewide Freight Plan. http://www.dot.state.oh.us/Divisions/Planning/SPR/StatewidePlanning/Documents/ODOT_FreightPlan_FINAL_1.30.17.pdf
9. Ohio Rail Development Corp. Ohio's Intermodal Railroad Terminals. https://www.dot.state.oh.us/Divisions/Rail/Documents/Ohio's%20Intermodal%20Railroad%20Terminals.pdf
10. Pennsylvania DOT. Comprehensive Freight Movement Plan. http://www.penndot.gov/ProjectAndPrograms/Planning/Documents/PennDOT-CFMP%20-%20FINAL%20August%202016.pdf
11. Southwestern Pennsylvania Commission. Southwestern Pennsylvania Regional Freight Plan. 2016. http://www.spcregion.org/pub_freight.asp
12. U.S. DOT National Freight Strategic Plan. 2015. https://www.transportation.gov/freight/NFSP
13. U.S. DOT Strategic Plan for FY2018-2022, Draft for Public Comment. Oct. 19, 2017. https://www.transportation.gov/dot-strategic-plan

APPENDIX C: KEY CONTACTS

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